THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXVI. No. 907.] LONDON, SEPTEMBER 28, 1880. [32nd Year. Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
ERITH,
OFFICES:
2, CROSBY SQUARE,
LONDON, E.C.

GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
Several Prize Medals. Established over 20 Years.
These Paints are now used by all the London Gas Companies and most of the principal Country Gas Companies, on Gas-holders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
Supplied, mixed ready for use, or in paste, as desired.
TORBAY PAINT COMPANY.
Proprietors: STEVENS & CO.,
21, GREAT WINCHESTER STREET, LONDON.
Works: BRIXHAM, TORBAY.

TUBES.
Tubes and Fittings for Gas, Steam, Water, and Hydraulic purposes, plain, galvanized, white enamelled inside, or coated by Dr. Angus Smith's process, or oxidized by Professor Barff's patent process. Gas-fitters tools, brass cocks, &c.

JOHN SPENCER,
VULCAN TUBE WORKS,
WEST BROMWICH, STAFFORDSHIRE,
AND
97, CANNON STREET, LONDON.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL & CO.,
LIMITED,
Established at the commencement of Gas Lighting,
Manufacturers of
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
Paris, 1878.
Head London Office:
145, QUEEN VICTORIA STREET.
ALMA TUBE-WORKS, WALSALL;
OLD PATENT TUBE-WORKS, WEDNESBURY.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
Manufacturers of
WET AND DRY GAS-METERS,
Licensees and Manufacturers of
HUNTS
PATENT COMPENSATING METERS,
STREET-LAMPS, &c., &c.
Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
Manufacturers of
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work.
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

THE
"OTTO" GAS-ENGINE,
From ½ to 40 H.P. ind.
See Page 486.

CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

GEORGE GLOVER AND CO.,

PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
AND MANUFACTURERS OF
IMPROVED DRY GAS-METERS.
GOLD MEDAL. HIGHEST AWARD.

INTERNATIONAL EXHIBITION,
SYDNEY, 1880.

RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.
1, LANCASTER AVENUE, MANCHESTER.

Foreign Agents: DAHL BROS., Copenhagen; A. FAAS & CO., Frankfort-on-Maine; W. HOVEN & SON, Rotterdam; COPLAND & M'LAREN, Montreal; A. DEMPSTER, 57, Elizabeth Street, Melbourne.

WELLINGTON TUBE WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE.

JOSEPH AIRD,

GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER AND BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM (Established 1765),

MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST-IRON TANKS FOR DITTO.

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS.

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

GOLDSMITH'S PATENT SIGHT WATER-LINE INDICATING GAS-METER.

MANUFACTURED BY GUEST AND CHRIMES,

FOUNDRY AND GENERAL BRASS WORKS,
ROTHERHAM;
AND 35, SOUTHWARK ST., LONDON, S.E.

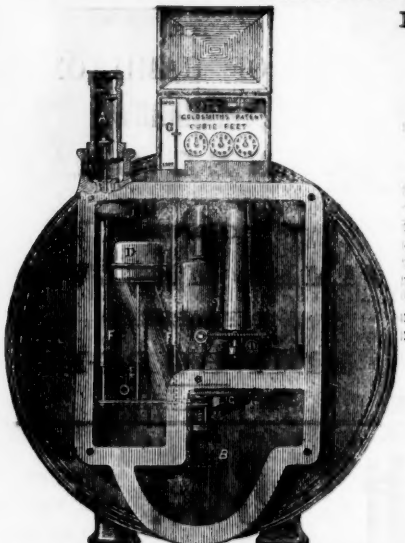


FIG. 1.—Three-light Meter, One-sixth Size.

Fig. 1 is a Meter with front removed to show the arrangement and connection of the Indicator and Valve.

Fig. 2 is front view of Index, with cover up.

The principal object of this invention is to render the water-line in the reservoir at all times visible. It will be seen, by reference to the illustrations, that this is accomplished in the following manner:—On the dial are the words "Open" and "Shut," and attached to the float is the pointer G, which rises and falls with the water-line in the reservoir. If the pointer is at "Open," it shows that the valve is open, and that the reservoir is full. If it is at "Shut," it shows that the reservoir is empty, and that the gas will be shut off.

The following ADVANTAGES will be obvious:—

1. The Inspector can see at a glance if the Meter requires water.
2. No more water than is required need be added, and therefore no water has to run out.
3. The Meter Inspector will be spared a great deal of his most objectionable work, and he will save a great deal of time and trouble.
4. The consumer will not always have to be asked for water, nor will he have to endure the unpleasant smell caused by waste water being run out.

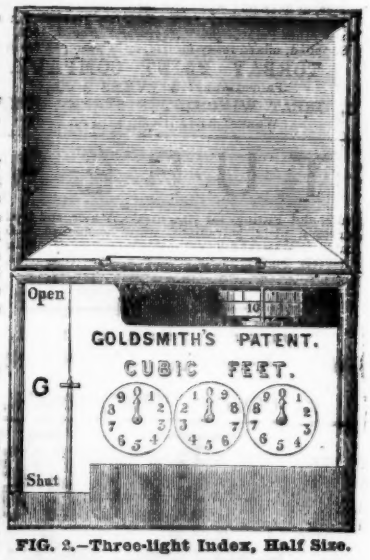


FIG. 2.—Three-light Index, Half Size.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;
LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;
HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.,
GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID.

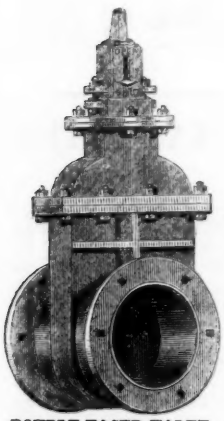
By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

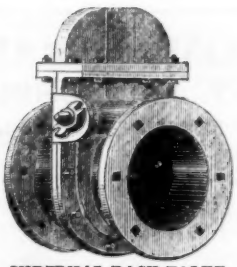
Drawings, Specifications, and Estimates supplied on application.

LONDON OFFICES: 97, CANNON STREET—JAMES E. & SAMUEL SPENCER, AGENTS.

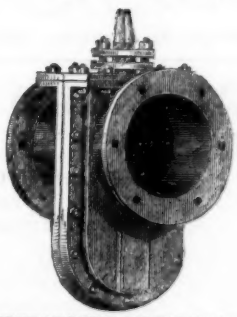
C. & W. WALKERS' GAS-VALVES.



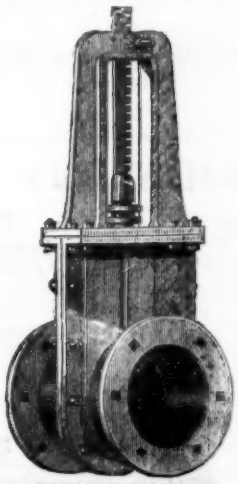
DOUBLE-FACED VALVE SPECIALLY FOR PURIFIERS.



INTERNAL RACK-VALVE WITH STEEL PINION, FOR GENERAL USE.



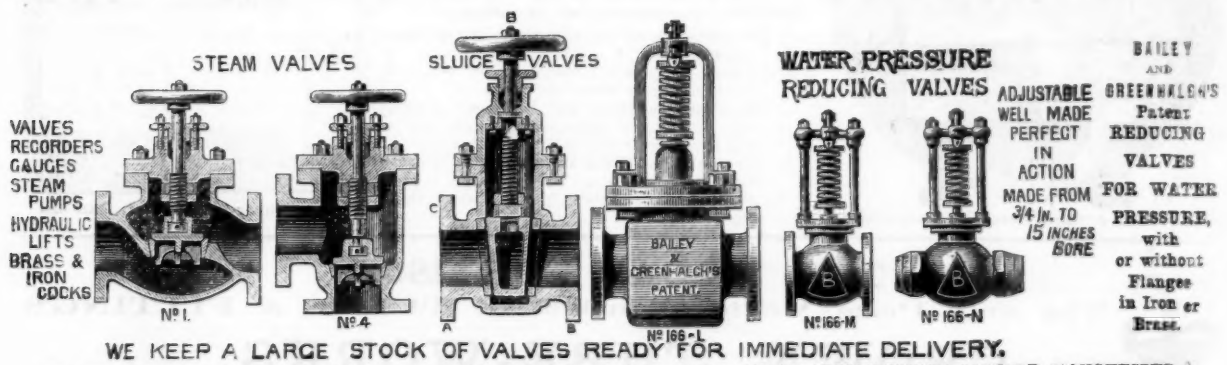
UNDERGROUND SCREW-VALVE FOR SHALLOW STREET-MAINS.



ORDINARY RACK AND PINION VALVE.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.



WE KEEP A LARGE STOCK OF VALVES READY FOR IMMEDIATE DELIVERY.

W. & H. BAILEY CO., Valve and Cock Makers, General Brass Founders for Gas and Water Works, ALBION WORKS, SALFORD, MANCHESTER.

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

GAS PURIFICATION

BY

OXIDE OF IRON.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

MECHANICAL CONDENSATION.

The undersigned has arranged with Messrs. Pelouze and Audouin the exclusive agency for their patented system of Condensation, in Great Britain and the Colonies.

The following are some of the advantages which this philosophic mode of arresting liquefiable vapours possesses:—

1. It acts irrespective of temperature.
2. It requires no motive power, but automatically adapts itself to production.
3. It may be fixed directly after the hydraulic main, by which prolonged contact of the gas with tar is avoided, and the highest standard of illuminating power is obtained which the coal is capable of giving; or it may be fixed directly after an ordinary air condenser, when it will arrest the vapoury globules which cooling alone will not stop, and the production of tar and ammonia water is thereby increased.
4. It effects a considerable saving in purification, through no tar getting to the material to clog its action.
5. It entirely supersedes the necessity of scrubbers; and if wet sawdust be used in a purifier, washers also are unnecessary.
6. It occupies but little space, and avoids that which is now considered a disadvantage—the too much cooling, scrubbing, and washing of gas.

Further particulars may be obtained of

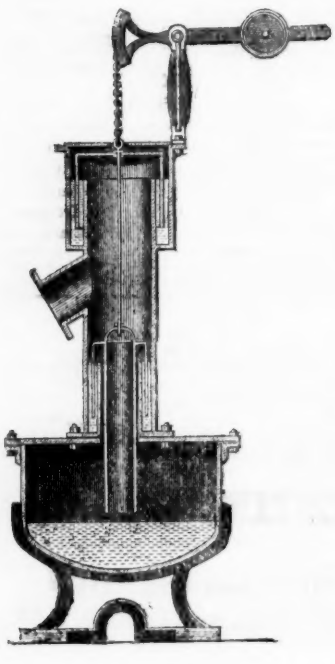
GEO. BOWER, St. Neots, Hunts.

NOTE.—*Gas-works contracted for complete, or apparatus supplied in detail from the retort to the burner. "The Gas and Water Engineer's Book of Reference," post free, 5s. "Handy Abstract of the Public Health Act, 1875," post free, 1s.*

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



The following Testimonials, as to five years constant working of this Patent Removable Dip, have been received:—

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Jan. 15, 1874.

MESSRS. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Dec. 30, 1879.

MESSRS. CHANDLER and SONS.

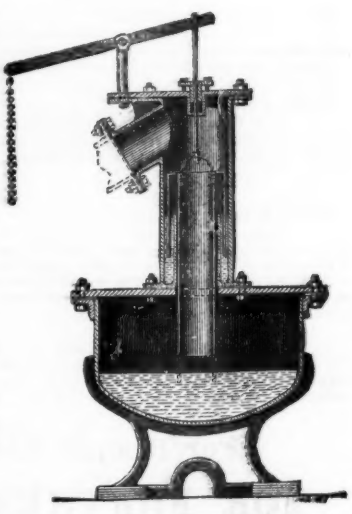
DEAR SIRS,

In reply to your inquiry, it is with very much pleasure thatI endorse every word of my letter of Jan. 15, 1874; and I may add that from the date the Patent Dips were fitted, they have worked perfectly, and there is very little carbon deposited in the retorts, in consequence of the lower pressure.

Yours faithfully,

(Signed) W. CRICKMAY,

Memb. Soc. Engineers.



APPLICATIONS TO BE MADE TO

Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER,

FOR

GAS PURIFICATION,

TAKES OUT EVERY TRACE OF AMMONIA AND A LARGE QUANTITY OF CARBONIC ACID AND SULPHURETTED HYDROGEN BY ONCE PASSING THROUGH THE MACHINE.

AMMONIACAL LIQUOR OBTAINED OF ANY REQUIRED STRENGTH.

The Cost of the Machine defrayed by the Ammonia obtained in Twelve Months.

It requires very little attention, and cannot get out of order.

These Machines, which contain from 3200 feet to 65,000 feet of Wetted Surface, are supplied to the following Gas-Works:—

	Feet per Day.		Feet per Day.
The Gaslight Company, London—		Glossop Company	300,000
Beckton	5,000,000	Holywood Company	125,000
Bromley	7,000,000	Heywood Local Board	600,000
St. Pancras	3,000,000	Leeds Corporation	2,000,000
Bradford Corporation	1,000,000	Leominster Company	150,000
Bremen	150,000	Maidstone Company	1,000,000
Buxton Local Board	250,000	Phœnix Company, Greenwich	2,500,000
Dukinfield Local Board	500,000	„ „ Vauxhall	3,000,000
Driffield Company	100,000	Woolwich Equitable Company	400,000
Goole Company	250,000	Yeadon Company	500,000

And many in course of Construction, among others—

Feet per Day each.	For	Feet per Day each.	For
Four for 3,000,000	Corporation of Leeds.	One for 1,000,000	West Bromwich Improvement [Commissioners.
Three „ 1,750,000	Corporation of Salford. [Station.	One „ 750,000	Radcliffe and Pilkington Gas Co.
One „ 2,500,000	The Gaslight Co., Shoreditch	One „ 500,000	Oldbury Local Board.
Two „ 1,250,000	The Gaslight Company, Beckton.	One „ 150,000	Falmouth Gas Company.
One „ 3,000,000	London Gas Co., Nine Elms.	One „ 250,000	European Gas Company, Rouen.
One „ 1,250,000	Corporation of Nottingham.	One „ 200,000	Deal Gas Company.
One „ 2,000,000	Cheltenham Gas Company.		

TESTIMONIALS.

Messrs. Kirkham and Hersey. *The Gaslight and Coke Company, Beckton, North Woolwich, June 8, 1880.*

Gentlemen,—I enclose you some particulars of the working of your Washers here, and I intend having some more experiments made, as just now we are working the first Washer with liquor, and the second with water. Of course the fact of our having ordered two more in addition to the four which we have in use is a sufficient indication of my opinion of the value of the Washer. (Signed) G. C. TREWBY.

Messrs. Kirkham and Hersey. *South Metropolitan (late Phœnix) Gaslight Company, Engineer's Office, June 19, 1880.*

Dear Sirs,—The "Standard" Washer which you supplied for use at our Vauxhall station has afforded me entire satisfaction. It was designed to remove the ammonia from 3 million cubic feet of gas per day, and during the past winter it did so with a good working margin to spare. It is as excellent now in workmanship as in design, and is well worthy of the general acceptance with which it appears to be meeting.

I am, faithfully yours, (Signed) CORBET WOODALL.

Messrs. Kirkham and Hersey. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Aug. 12, 1879.*

Gentlemen,—In reply to your inquiry, one of your Patent Scrubber-Washers to purify 100,000 cubic feet per hour was put into operation at these works on the 1st of June. At the same moment the whole of our Scrubbers, equal to 28,000 cubic feet, were thrown out of use, leaving your Washer the whole work of freeing the gas from Ammonia. This it has done to perfection up to date. With 10 gallons of water to each ton of coal carbonized passing through it we get a clean test at the seventh chamber, leaving four chambers margin for extra work. The mean quantity of Ammonia in the inlet (fixed and free), obtained from a large number of tests, was 241 grains per 100 feet of gas. On the outlet—Free Ammonia—Nil. The quantity of water used is 10 gallons per ton of coal carbonized. The strength of liquor as follows:—

Chamber No.	1	2	3	4	5	6	7	8	9	10	11
Strength of liquor—ounces	Nil.	Nil.	Nil.	Nil.	0·4	1·0	2·2	3·5	5·5	8·25	12·5

We are working five revolutions per minute. It takes out all the free Ammonia, reduces the carbonic acid and sulphuretted hydrogen 30 per cent., requires a very small amount of power to drive, and altogether is, in my opinion, the best machine for the purpose yet invented, and will, I feel confident, ere long, entirely supersede the Scrubbers of to-day. I am glad to find you are going to fix one of these Washers at our Vauxhall works.

(Signed) P. J. WATES, Engineer.

For Results and other Testimonials, see next week's Journal.

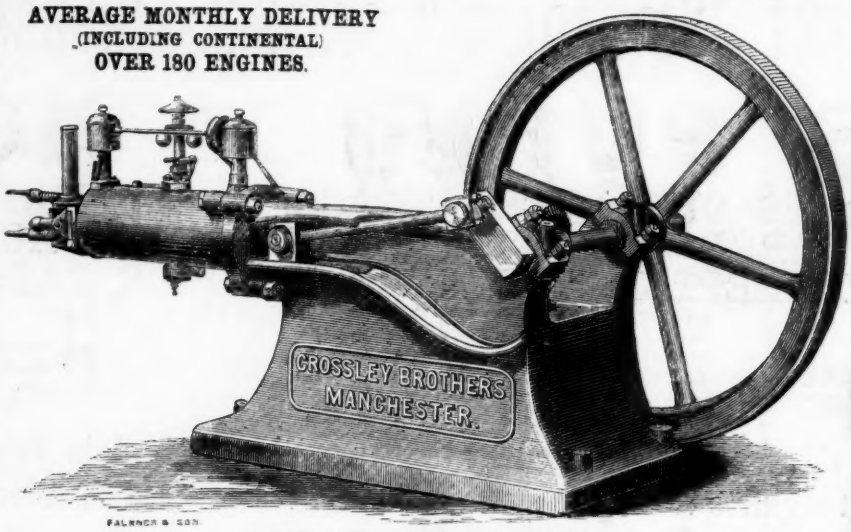
FOR FURTHER PARTICULARS AND TESTIMONIALS, ADDRESS MESSRS.

KIRKHAM, HULETT, & CHANDLER, LIMITED, 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

AN ENGINE WHICH WORKS WITHOUT A BOILER OR STEAM

These Engines are used at the following Gas-Works:—Birmingham, Brentford, Bucharest, Bishop Stortford, Driffield, Dundalk, Dundee, Dublin, Huddersfield, Hinckley. London—London Gas-Works, Phœnix Gas Co., Gaslight and Coke Co., South Metropolitan Gas Co., Commercial Gas Co., Crystal Palace District, Leominster, Edinburgh and Leith, Ludlow Union, Lancaster, Maidstone, Nuneaton, Northampton.

AVERAGE MONTHLY DELIVERY
(INCLUDING CONTINENTAL)
OVER 180 ENGINES.



Shanghai, Sheffield, Worcester, Wantage, &c.

Over 2500 already delivered.

Very numerous Testimonials from Users, including Engineers, Men of Science, and others, on application to the makers.

No trouble with Coal, Ashes, Smoke, Insurance, Water, or constant attendance.

No Glands to pack, or Water Gauges and Steam Gauges to watch.

STARTS AT A MOMENT'S NOTICE.

THE "OTTO" SILENT GAS-ENGINE,

From ½ to 40 Horse Power Indicated.

(Otto and Crossley's Patents, 1876 and 1877.)

THEY ARE USED FOR ALL KINDS OF PURPOSES, CHIEFLY FOR EXHAUSTERS, SCRUBBERS, & PUMPS.

DELIVERED IN MANCHESTER. CASES NOT CHARGED IF RETURNED FREE.

PRICES INCLUDE CAST-IRON STAND, TURNED FLY-WHEEL, AND DRIVING PULLEY; WATER-VESSEL, SEVERAL DUPLICATES, AND GAS-FITTINGS (EXCEPTING METER AND PIPES).

WORKS AND HEAD OFFICES:
Gt. Marlbro' St., Gloster St.

CROSSLEY BROTHERS,

MANCHESTER.

LONDON HOUSE:
116, Queen Victoria St., E.C.

HANNA, DONALD, & WILSON,

(ESTABLISHED 1851,)

GAS ENGINEERS & CONTRACTORS

FOR THE

ERECTION OF GAS AND WATER WORKS,

TELESCOPIC AND SINGLE-LIFT GASHOLDERS,

CAST AND WROUGHT IRON GASHOLDER-TANKS,

IMPROVED FIXED OR TRAVELLING HYDRAULIC PURIFIER-COVER LIFTERS,

PURIFIERS, CONDENSERS, SCRUBBERS, EXHAUSTERS, AND PUMPING-ENGINES,

TAR AND LIQUOR PUMPS, HYDRAULIC SLUICE AND SLIDE VALVES, LAMP-POSTS AND HYDRANTS COMBINED.

DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

London Office: 9, FENCHURCH STREET, E.C.

ABERCORN FOUNDRY & ABBEY WORKS, PAISLEY, N.B.

PARIS EXHIBITION, 1878.

THREE MEDALS

AND

HONOURABLE MENTION

HAVE BEEN AWARDED TO

JOSEPH CLIFF & SONS

For their Various Exhibits, amongst which is a

SILVER MEDAL

FOR THEIR

PATENT MACHINE-MADE

RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this class.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

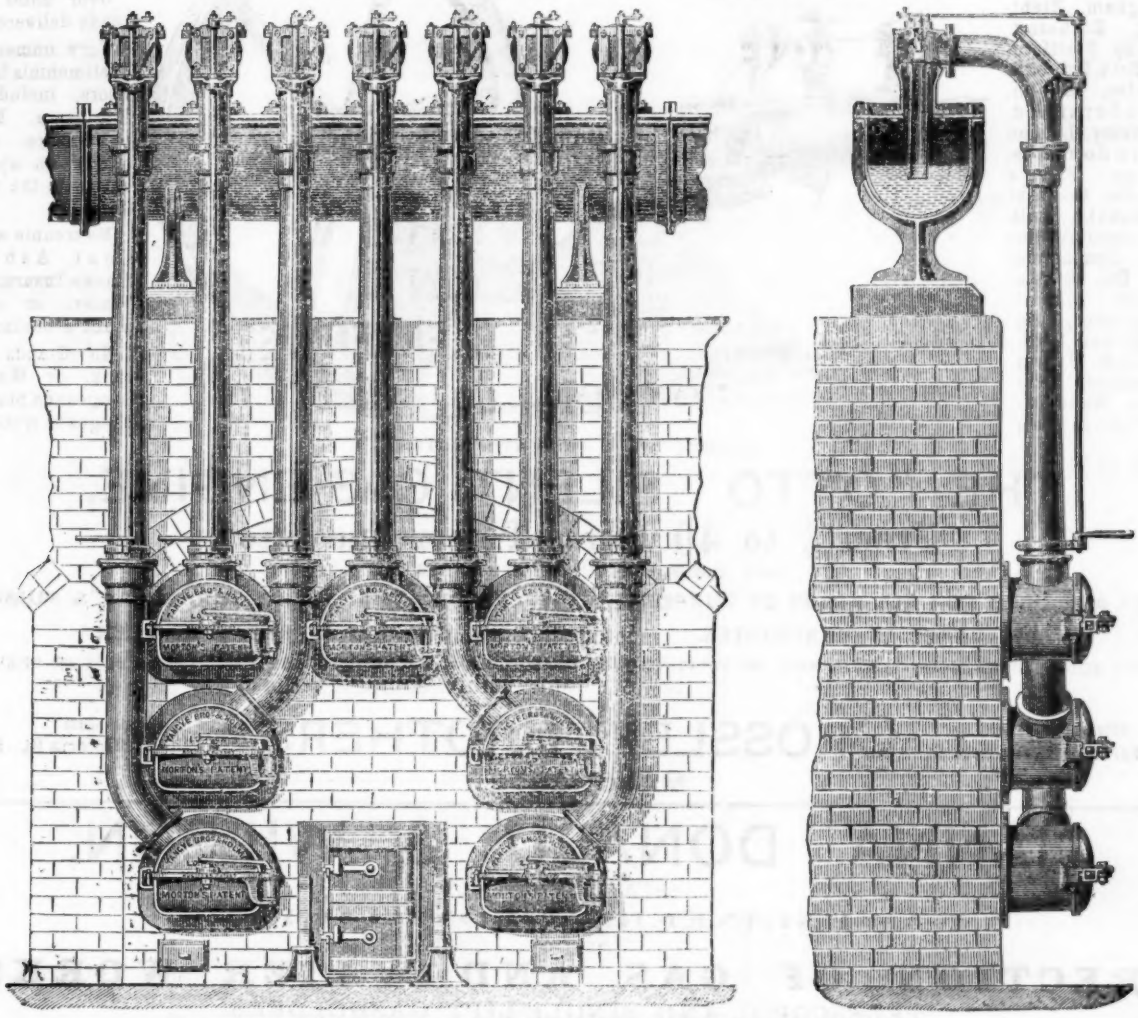
WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

HOLMAN'S PATENT
NON-PRESSURE VALVULAR SEAL-PIPES
FOR
HYDRAULIC MAINS.



The salient features of the above arrangement are as follows:—

1. The Seal is instantaneously opened and closed from the stage by the stokers.
2. There are only two positions for the actuating lever: one when the Seal is opened during the period of carbonization, the other when it is closed for drawing and charging the retort.
3. The retort can never be blocked, because the port directing the gas *through* the Seal is always opened, and the port permitting the gas to *pass* the Seal *direct* into the hydraulic main is also open while the retort is at work.
4. The manager and stokers can always see at a glance, by the position of the lever, whether the retort is duly unsealed while carbonizing its charge.
5. There are no extraneous seals, stuffing-boxes, hinges, screws, chains, pulleys, springs, teeth, or other complication belonging to the valves; they are made plain and strong for rough use, and will last many years without renewal.
6. The valve faces are always covered and never separated, hence no foreign matter can put them out of action.
7. They are positive, reliable, interchangeable, free from all the uncertainty of automatic arrangements, and low in price.
8. No extra pipes or connections are required, because the Valvular Seal-pipe is self-contained in the single branch of the ascension-pipe, which stands on the hydraulic main, and is easily accessible by removing an ordinary cover secured by two bolts only.

(238) TWO HUNDRED AND THIRTY-EIGHT HOLMAN'S PATENT VALVULAR SEAL-PIPES are being fitted to the Hydraulic Mains at the Radford Station of the Corporation Gas-Works at Nottingham.

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They are to be fitted to the Hydraulic Mains of the New Retort-House at the LONDON GAS-WORKS, and at other large stations.

Mr. MORTON writes in the following terms, under date of Feb. 3, 1880:—

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London, 1851. New York. 1853. Paris, 1855. London. 1862.

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PATENT DRY GAS-METERS,

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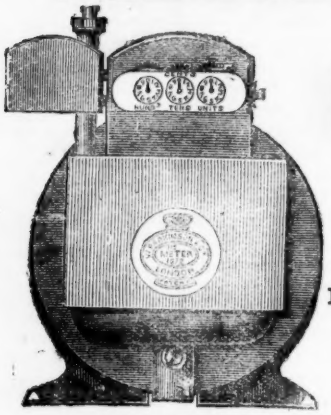

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WET & DRY METERS,

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PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

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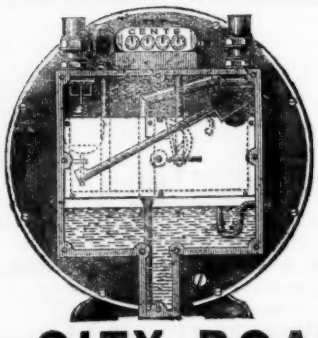
In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

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COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

W. M.—*Have not had time to get the necessary illustrations prepared for this week.*

T. S.—*The fire was the result of the rapid oxidation of the impure material on exposure to air. You should not leave it in the purifier so long after it requires to be cleared away. No danger will arise if the foul lime is always removed from the purifier as soon as possible after it is thrown out of work.*

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 28, 1880.

Circular to Gas Companies.

THE report of the Directors of the Commercial Gas Company, with the statement of accounts for the half year ended the 30th of June last, has been issued in anticipation of the ordinary general meeting of the Company to be held on the 1st prox., and as the Directors are enabled to notify their intention of advising the payment of the same rates of dividend as were declared in April last, the result of the half year's working must be considered as being very satisfactory to the Shareholders. Precisely the same amount, £34,600, is set aside for payment of dividends for the past half year as for the same period immediately preceding, there having been no increase in the interest-earning capital of the Company, although a fresh issue of stock has since been made, as advised at the April meeting, and a portion of the amount appears to have already been paid in. With an initial price under the sliding scale of 3s. 9d. per thousand cubic feet, the Company have for a year past been selling gas at 3s. 3d., and, therefore, are strictly entitled to divide one and a half per cent. over the standard dividends of ten per cent. on their old, and seven per cent. on their new stock. But the necessity of providing for the regular addition of £6200 to the credit of the insurance-fund, which was established in accordance with the Commercial Gas Act of 1875, and of paying £1575 interest on debentures, induce the Directors to advise the payment of eleven and a quarter and eight and a quarter per cent. respectively on the old and new stock, leaving a balance to be carried forward. The increase in the Company's business, when compared with the corresponding period of the previous year, although amounting to the respectable addition of something over 31 million cubic feet to the total amount of gas sold, was not quite so great as the increase of the first half of the year 1879 over the same period of 1878. But an improvement is apparent in the quantity of gas sold per ton of coal, as given in the present statement of accounts, when compared with the corresponding period last year, the increase amounting to 340 cubic feet per ton. The gross receipts for gas were about £30 less than during the six months ending June 30, 1879, although the price was twopence per thousand feet lower, while the receipts for residuals were nearly £5000 more. Bad debts show an increase, but law charges almost disappear, and the Company must be considered as having transacted their business very smoothly, when it is observed that their legal expenses for six months have not amounted to £3 in all. On the whole, the Company must be congratulated on having made steady progress during the half year, both in extending their business operations and in their internal administration. Their district is perhaps not the most desirable one in some respects, but it allows ample scope for doing a good trade in gas and residuals. The position of the Company is well secured, and, to our way of thinking, it has at least not been weakened by recent legislation.

The report of the Directors of the London Gaslight Company has also been issued this week, the general meeting of the Company being announced for the 6th prox. There is a fine old flavour, not, however, in this case tinged with mustiness, in the published accounts of the proceedings of a Company which alone, among all the lessening number of Metropolitan Gas Companies, works under the system of maximum dividends, and appears to do very well under conditions which its neighbours have either willingly cast aside, or had forcibly stripped from them. How long this unique specimen of a gas organization, belonging to a class which, whether for good or for evil, is fast becoming extinct, will retain its lonely position, it is not for us to inquire. We, like other interested spectators, must await the issue of events, with the belief that the conflict of the new and the old must end sooner or later in the usual way; but we refrain from indulging in any prophecy respecting the possible circumstances attending the issue. For the present it is announced that a dividend after the rate of ten per cent. on the ordinary stock of the Company will be recommended at the meeting, from profit made out of gas sold at 3s. 3d. per thousand feet—the same price, be it noted, as is charged by the Commercial Company. The receipts for gas have increased nearly £4000 over those for the corresponding period of 1879; but, on the other hand, the coke and breeze sales show a falling-off of rather over £4000. Turning to the working statements, there is an increase of about 22 millions of cubic feet of gas sold as compared with the corresponding period of last year; and the quantity unaccounted for, although showing some increase, is still proportionately low. The Company have no insurance-fund, but their reserve-fund stands at £76,762 7s. 4d. It may be remarked, by way of explaining the position of the London Company with respect to capital and profits, that they have as yet £111,693 of ordinary "A" shares, bearing interest at the rate of 6 per cent. per annum, not called up, and they have power to borrow £81,305 more. They are empowered to charge 4s. 6d. per thousand feet for twelve-candle gas, if required for securing their maximum dividends; and their ordinary stock is not large. Their works are, moreover, very complete and well appointed. Considerations respecting the land at their disposal and the geography of their district prevent their prospects being altogether rose-coloured, though enough has been said to show that they are not yet in desperate case—in fact, in many respects they possess valuable advantages; but, as we have already said, time is against them as an independent organization. With these remarks we leave the subject until we shall have occasion to deal with what transpires at the impending meeting.

At the ordinary meeting of the Harrow District Gas Company, held on Wednesday last, the Chairman, in moving the adoption of the report, which among other things recommended the payment of a dividend at the rate of six per cent. per annum, referred to the stimulus that the new railway was

generally expected to give to the business of the locality, and, consequently, of the Company. The price of gas in Harrow has been 6s. per thousand cubic feet, and it was at one time feared that this was a stereotyped figure; but the Directors have acted wisely in giving notice of a reduction in price, although they have only reached a six per cent. dividend. If they continue to court an extended consumption in this way, now that there is a probability of more business flowing in upon them, it will, perhaps, not be long before they will be able to sell gas still cheaper, and realize higher dividends.

The report of the Directors of the Shrewsbury Gaslight and Coke Company, presented at the annual meeting of the Company on Thursday last, was remarkable as announcing a year of successful working unprecedented in the history of the Company. For twenty years the normal increase in their sale of gas was about 2½ million cubic feet per annum, but last year the increase was between 5 and 6 million cubic feet. This was principally due to the circumstance that by a reduction taking effect from September last, the price of the Company's gas was lowered to 3s. per thousand feet, which it is needless to say is less than has ever been charged in Shrewsbury. The elasticity of revenue following this reduction was so marked in the present instance that instead of a loss of £800, which the diminution in price appeared to entail at the time when it took place, the accounts for the year actually show a gross increase of £550 in the gas-rentals. This is a very notable illustration of the result of cheapening gas, for the circumstances of the locality are not such as to indicate a rapidly expanding consumption under ordinary conditions. The Company have also effected a considerable saving in the proportion of unaccounted-for gas, which from 7·15 per cent. has been reduced to 5·31 per cent.—a very fair success for one year's exertions in this direction. The Company's stock now pays a dividend after the rate of seven and a half per cent. per annum, and their position is prosperous and promising.

There is some dissatisfaction at Mile End respecting the leakage of gas from the street-mains. There are two discontented parties in the case—the Vestry, as representing the inhabitants, who are annoyed by the smell of the escaping gas; and the unfortunate Gas Company, who suffer the loss of the gas, and have also to bear the expense of finding and stopping the leaks. A third person, at a recent meeting of the Vestry, when the matter was discussed, put in a claim to be considered aggrieved thereby, and this was the Surveyor to the Vestry, who complained that his own exertions and the outlay of public money in making and repairing roads were both frequently thrown away, in consequence of the Gas or Water Companies coming, directly after a road had been made perfect, and digging it up again. This is a sore point of ancient standing between highway authorities and people who have to lay down pipes in the roads, and as long as things remain as they are, and considerations of the convenience of one section of the community render it unavoidable that the convenience of another, or perhaps the same section in another capacity, should be occasionally interfered with, the dispute will continue open. But in this as in most sources of contention, mutual concessions may do much to eliminate its bitterness. District Surveyors and their employers must know that Gas Companies and others do not break up roads without cause, and as to the general disturbance of a highway for the purpose of finding out leaks in gas-mains, it must be remembered that this is frequently rendered necessary by the very means employed by the road makers for perfecting their work. Gas-mains are occasionally imperfectly laid, and consequently leak, necessitating extensive repairs at some subsequent time; but this does not often happen with wealthy and well-managed Gas Companies. It is more frequently found that subsoil sinks or is washed away, old drains fall in, or a heavy roller or unusually heavy traffic passes over mains previously sound, and the consequence is a general leakage, causing annoyance to residents in the neighbourhood, and entailing trouble and loss on the Gas Company. But in all this the Company is not solely to blame, and Road Surveyors should not assume so frequently as they do that the road itself is always perfect, and that the fault lies entirely with the pipes.

The quarrel between the Bedford Town Council and the Gas Company is getting deadly. First, the Council attacked the Company on the question of the illuminating power of the gas supplied by them, and a Committee of the representatives of the injured "ratepayers" was constituted to exercise the functions of gas examiners, the result of their labours being failure to convict the Gas Company, or to appease the malcontents, and the addition of a vague feeling of having made an exhibition of themselves, to the previous discontent of the Council. Having abandoned the attempt to instruct the gas officials in the manner of testing gas for illuminating power, the Council next charged the Company with supplying sulphuretted hydrogen with their gas. These charges of defects in manufacture soon, however, gave place to a graver indictment, having direct reference to the manner in which the Gas Company kept their accounts. The Gas Committee of the Town Council have reported that they consider the accounts furnished by the Gas Company to be very imperfect, and not in accordance with the Gas-Works Clauses Amendment Act of 1871. The Company will probably contend that in the matter of accounts, as in that of the method of testing for illuminating power, they follow their own private Act, as they have always done hitherto; but the Council have already expressed their intention of judging the Company by the light of the general legislation of 1871. The Gas Committee hazarded the opinion, in reference to the accounts supplied to them, that there was a sum of £20,000 not accounted for; but, evidently feeling insecure on the question of book-keeping, they wished for power to appoint a qualified Accountant to examine the Company's books. The matter was, however, eventually adjourned for a fortnight, during which interval every member of the Council is to have an opportunity of exercising his acuteness in unravelling the alleged complexity of the accounts, and consequently we may expect, at the expiration of that time, to be informed of the next action to be taken by the Council.

A curious little dispute on the bill for lighting the public lamps has divided the Town Council of Clitheroe. The gas-works belong to the Corporation, and the account in question was made out for a certain amount, by whom does not clearly appear, for the next thing mentioned is that the Gas Managing Committee reduced it by about £40, and recommended it to the Council for settlement. Meanwhile the Lighting Committee, who had not been consulted in the matter, wanted to reduce it still more; but the Gas Committee pressed for payment. When the matter came before the Council, exception was taken, with much reason on the part of the Lighting Committee, against the principle of a Committee passing their own accounts for payment, and they therefore wished to have the unfortunate little bill referred back to them for curtailment. The whole dispute is, of course, trivial, being merely a difficulty as to which pocket a few pounds belonging to the same owner should be carried in; but, as a worthy Alderman remarked, it showed that the members of the Council must quarrel with some one, and having now no Gas Company to quarrel with, they fell out among themselves, probably by way of diversion, and in memory of old times. Eventually the account was passed, a proposal to "split the "difference" being rejected, perhaps because such a rough-and-ready proceeding was thought inconsistent with the settlement of a question of principle.

To-day the Exhibition of Apparatus used in the Production of Artificial Light will be opened in Glasgow, and if the preliminary announcements referring to it are justified by accomplished facts, the exhibition will mark an era in the modern history of illumination by artificial means. Such, at least, has been the expressed intention of its promoters, who have done their utmost to give their enterprise a more than local importance. We shall soon see whether their efforts to surpass not merely everything of the kind that has yet been seen in the North, but also anything hitherto held in any part of the United Kingdom, have met with a deserved success; or whether we shall have to chronicle another local exhibition, larger perhaps than usual, but without general interest. From such a lame and impotent result we most sincerely trust their good fortune has shielded Mr. J. Mann, the Secretary, and the Committee who have been charged with making the necessary arrangements.

The Fourth Congress of the Sanitary Institute of Great Britain, which, as stated in another column, was opened in Exeter, under the presidency of Earl Fortescue, on Tuesday last, was signalized by the inauguration of an exhibition of sanitary appliances and gas cooking apparatus, the latter class of exhibits being under the auspices of the Exeter Gas Company, who have offered medals for the best cooking stoves. The exhibition was held in the new abattoirs built by the Exeter Corporation on ground purchased from the Gas Company, and lately the site of the old gas-works, which were among the earliest constructed on the introduction of gas lighting. After the exhibition had been formally opened, the business of the Congress commenced with the delivery of the President's Inaugural Address, which dealt principally with matters relating to public health. In one portion of

his address, however, the President mentioned the subject of monopoly with respect to gas and water supply, and it was with evident self-congratulation that he brought up certain remarks made in the course of a lecture delivered by himself in 1845, and used them to express his views on the present occasion. It is not every man who could safely quote the opinions he may have expressed thirty-five years ago concerning an economical subject, without finding it necessary to modify or repudiate them. It is creditable to Earl Fortescue's early acumen that he at that time distinctly maintained the inapplicability of the principle of competition in trade when the supply of gas or water is in question. It may be remarked, in amplification of Earl Fortescue's reasons for this conclusion, that the large proportion of capital sunk in fixed works by Gas or Water Companies may be considered as so much given by way of guarantee or "hostage to fortune." For the protection of this sunk capital a local monopoly is needed, but it cannot be said that the useful check of competition is altogether wanting in such cases, for although it cannot be applied in the same place, it is always at hand in the records of similar contemporary enterprises elsewhere. That this corrective should more frequently be applied by the consumers, by way of threat to the monopolists, and appropriated by the latter under the influence of care for their own continued existence, rather than for the mere sake of doing their best for their customers, is perhaps only natural on both sides, although there are many honourable exceptions to the rule that monopolies create selfishness and inactivity. There is little to find fault with in Earl Fortescue's ideas respecting the propriety of gas and water undertakings becoming the property of the public, with due regard to the interests of the first adventurers in such enterprises. The opinion expressed by the President in 1845 respecting the best method of managing this class of property when finally vested in the public—that they should be rented to contractors—needs, however, an amendment which does not appear to have been made. No one at the present day would advocate dealing in this way with such necessaries of life as gas and water. For tramways, or property of the same character, involving the use of much floating capital, private interested management is probably the best, though even this is open to question; but we cannot think that with Earl Fortescue's mature experience he was speaking with his usual care when he neglected to correct the false impression made by his earlier words. It may be regretted that he did not touch upon the subject of the proper use of the profits derivable from public property in gas or water. A sound exposition of this much-debated problem would have been valuable, and might have taught us the extent of Earl Fortescue's progress in the economics of local self-government since 1845, which is not so clearly manifested as might have been wished. Beyond this somewhat historical comment on one of the principal points of interest in the corporate management of gas and water supply, the address contained no general reference to gas undertakings.

SERJEANT SARGOOD who, as many of our readers will remember, a few years since played a very prominent part in Parliamentary Committees on Gas and Water Bills, and whose name was constantly appearing in our pages, died suddenly at Frankfort, on the 14th inst., of apoplexy of the heart. The deceased gentleman was 65 years of age at the time of his death.

THE Manchester Corporation Gas Committee recently advertised for an "efficient draughtsman who has a thorough practical knowledge of gas-works, and is competent to undertake the preparation of plans in connection with the construction and alteration of the various works and apparatus used in the manufacture of gas, and who has a good knowledge of general engineering work." We understand that Mr. Herbert Hutchinson, a native of Barnsley, and son of Mr. John Hutchinson, who for nearly 30 years has had the management of the gas-works there, has received the appointment, and commenced his duties on Monday last week.

THE WATER SUPPLY OF STROUD.—In 1875 the Stroud Water Company obtained an Act for supplying the borough with water. No steps were taken under it till this summer, when a few days before the time specified in the Act expired, works were energetically set about under a new directorate and staff. A large well has been sunk at Chalford, from which 13,000 gallons per hour are pumped, and a few houses have been connected. It is intended to construct a large reservoir at Minchinhampton, from which the whole borough will be supplied at a cheap rate. The supply will be a great boon, as good water is stated to be none too plentiful.

THE WATER SUPPLY OF PONTYPRIDD.—The Directors of the Pontypridd Water-Works Company have decided to proceed at once with the construction of new filtering-beds and a reservoir. Steps have, we understand, been taken to raise the remaining capital of £6450, £3600 of which has indeed already been promised. This will mark a new, and it is confidently believed, successful epoch in the history of the Company. The present filter-beds are undoubtedly inadequate to supply the whole of the large and scattered districts with water, and this drawback, supplemented by the still more important one of long-continued drought, explains the demurs made in some places by the ratepayers. But it should be remembered that the scarcity of water has of late been matter of complaint throughout the country generally, and the Pontypridd Company appear to have been as much to the fore as any other in devising means for obviating a recurrence of the contingencies complained of.

Water and Sanitary Notes.

FOLLOWING the disquieting remarks of Dr. Frankland in his August report on the Water Supply of London, we now have the official statement of Lieut.-Col. Bolton on the same subject. As usual, the two authorities exhibit a difference upon the main point. Dr. Frankland says: "The Thames water "supplied to London was of very bad quality," and "quite "unfit for dietetic purposes, owing to the large quantity of "organic matter which it contained." Lieut.-Col. Bolton, taking a common-sense view of the situation, says that the state of the water in the Thames at the intakes "was bad "from the 1st to the 3rd of August, when it became good, "and continued in that condition for the remainder of the "month." The water in the River Lea is described as being "good during the greater part of the month." These remarks, we are reminded, "refer to the condition of the water "previous to filtration." Generally, the water was efficiently filtered, but it is stated that the Thames water, as supplied to the consumers, was "slightly coloured and tainted by "organic matter." It is explained that this arose principally from the vegetation brought down by the flood waters in the early part of the month. Such matter, when found in the water supply of Glasgow, occasions Dr. Frankland no anxiety, any more than the "previous animal contamination" of the water taken from the chalk wells of the Kent Company. Dr. Mills, of Anderson's College, Glasgow, reports that the water supplied to that city from Loch Katrine during the month of August "was light brown in colour, and contained "much suspended matter." We presume that the Glasgow water might be described in much the same terms as the London supply, if a chemist thought fit to take that course. In either case we have some degree of colour, and a large quantity of organic matter. But in neither case can it be proved that the water is unwholesome, and the death-rate tells in favour of London.

The Town Crier of Derby has involved himself in a singular difficulty with reference to no less a subject than the purity of the water supply of that town. It is alleged that this individual, attired in all the robes of his office, including, we presume, the traditional cocked hat, went round the town ringing his bell and warning all the people that as they valued their existence they should carefully boil the town water before drinking it. As might be expected, this official intimation caused considerable alarm, as well as feelings of surprise. The Corporation have recently come into possession of the water-works, and it was imagined that the supply was perfectly wholesome. On inquiry it was found that the crier had received no instructions from the Corporation for this announcement, and—more strangely still—the crier emphatically denied having made any such proclamation. Nevertheless the voice had been heard, and those who heard it were convinced that it was the voice of the Corporation crier. The Markets Committee took the matter promptly in hand, and after a rigid investigation decided on suspending this mysterious functionary, pending the presentation of a report to the Corporation recommending that he be removed from his post. In the meantime the Water-Works Committee have published a report from Dr. Hehner, the Borough Analyst, showing that "the water supply of the town of Derby is of "excellent quality, the water being practically free from "organic matter, and absolutely so from indications of pollu-"tion." Doubtless, if the crier be guilty, as alleged, the offence is a serious one. But in London we take a different view of such matters. Here we have the water "cried down" every month by a gentleman who is not known to wear a cocked hat or carry a bell, and who is not so easily removable as the luckless functionary who is now undergoing suspension. Whether the alarming report originates with a bellman or a scientific chemist, we would advise the public to hope for the best, and not to allow themselves to be easily frightened.

With reference to the high mortality at Leicester—to which some allusion was made in this column last week—Dr. W. Johnstone, the local Medical Officer of Health, has published a statement explaining that the unwelcome phenomenon is occasioned by the large number of deaths among infants. This high infantile mortality occurs periodically, and deprives Leicester of the position it would otherwise occupy as one of the healthiest towns in England.

The Sanitary Congress in Exeter has met with all the success that could have been anticipated by its promoters. The gathering has been large, and the reception given to the sanitarians by the Mayor was extremely cordial. Earl Fortescue, the President, led off with a speech which, if not altogether accurate in some matters of fact, nevertheless had sufficient merit to be interesting. His lordship is far from

being satisfied with things as they are, and deplores the obstinacy of mankind in neglecting the teachings of Mr. Chadwick. The reports of the Board of Health, we are told, had they been adopted, would not only have saved millions to the inhabitants of London, but would also have added immensely to the wealth, comfort, and security of all classes. The London Water Companies ought to have been bought up when their capital was six millions, instead of being allowed to go on to an expenditure of twice that amount. London is also wrong with its drainage, the intercepting sewers being planned on an erroneous principle, and much of the work requiring to be done over again. While deploring the past, his lordship seems to have no very sanguine expectation as to the future. "The centralizing action "of successive bureaucratic Ministries" is impairing the principle of local self-government. Yet his lordship considers it desirable that on certain grave questions some control should be exercised on the part of a central power over the acts of the elected authority. For this reason he objects to the composition of the proposed Water Trust as recommended by the Select Committee. The Metropolitan Board he accuses of "costly mismanagement," the financial notions of the Corporation he deems unsound, and the Vestries he considers altogether incapable. The Earl observes that "the appointment of a practical dictator for a "short time to act in a particular crisis was not unknown "under Republican Governments, ancient and modern." The noble President of the Exeter Congress would, perhaps, not object to be dictator himself for a short time, or to see his friend, Mr. Chadwick, elevated to that post. Concerning the government of London, his lordship dwells upon "the "necessity of State regulation for capitals, as distinguished "from mere provincial towns." He would commit "the "vast local affairs of the Metropolis" to Imperial control, but with Municipal Authorities to carry out the details. His lordship hopes in this way to combine a species of dictatorship with a due admixture of local self-government. On the whole, it is pretty plain that Earl Fortescue has no great faith in the willingness of mankind to submit to sanitary regulations of an advanced type. An equal degree of dispondency was apparent in the remarks of Mr. Rawlinson, who concluded an address on "Engineering and Sanitary "Construction" by saying: "We are in the midst of a war "*furore*, and sanitary works can have no solid and satisfactory "progress under existing conditions."

According to Professor De Chaumont, the President of one of the Sections of the Sanitary Congress, the fall of the Roman Empire was in a great measure the era of retrogression in a sanitary sense. The Jew had the best of it, as he continued clean, while a mistaken asceticism in the Christian world led to much that was unsanitary. There can be no doubt that of late years there has been a considerable awakening to the value and duty of cleanliness. A very striking paper was read by Mr. H. C. Burdett, of the Greenwich Seamen's Hospital, on the "Unhealthiness of Public Institutions." The facts were remarkable, and it was asked whether the time had not arrived when the Royal Institute of British Architects should take up the subject of sanitary construction, its Council making regulations for the guidance, instruction, and training of the rising generation of architects. A "wide" discussion followed, in the course of which there was a distribution of censure among architects, engineers, and public officers. The last-named class were accused in many instances of being ignorant of the first principles of sanitary science. The workmen in the building trades also came under review, as occasionally executing their tasks badly in order to "make work" for their fellows, regardless of the peril to other people. The desirability of instituting some test as to the qualifications of sanitary officers is a subject which is evidently receiving an increasing amount of attention. An entirely different branch of the subject was discussed a day or two later by Dr. B. W. Richardson, F.R.S., who dilated before a crowded audience on the topic of "Woman as a Sanitary Reformer."

SALE OF SHARES IN THE WORCESTER GAS COMPANY.—On Friday last a number of shares in the Worcester Gas Company were sold at the Company's offices. The 40s. shares realized from 84s. to 84s. 6d., and the 35s. shares sold in the same proportion.

THE WATER SUPPLY OF HAYWARD'S HEATH.—A special meeting of the Hayward's Heath Local Board was held on Tuesday last—Mr. Bannister in the chair—to consider the subject of the water supply. Mr. M'Kenzie announced that the Cuckfield ratepayers had had the matter under their consideration, and had rejected the scheme submitted to them. Mr. C. O. Blaber having given some particulars as to the cost of the proposed supply, some general conversation on the subject ensued, and eventually the matter was adjourned till the next meeting of the Board.

HERR HASSE, OF DRESDEN, ON THE DETAILS OF GAS GENERATOR FURNACES.

At the last meeting of the German Gas and Water Works Managers Association at Heidelberg, referred to in a recent issue, Herr Hasse, of Dresden, contributed a number of observations of much interest on the construction and management of gas generator furnaces, with special reference to those minor details which invariably afford matter for investigation and comment, when the general nature and form of a novel invention have passed the stage of criticism, and entered that of general acceptance.

Herr Hasse expressly disclaimed any intention of discussing the question of gaseous fuel, which, as he said, had been referred to a Committee for trial some years since; and, although the Committee had never completed their labours, the main object with which they were undertaken had been attained. The principle of gas-firing was proved to be successful in practice, but the apparatus by which this fact was determined would have had to be entirely reconstructed in order to give the highest results of which the system was considered capable. For instance, it was found that the high temperature of the oven necessitated improved fire-clay blocks, and the foundation of the oven should have been much stronger, to avoid the slightest risk of settlement. The arch and inner piers also needed strengthening, and the setting ought to have been wider, to give increased space between the retorts, so as to lessen the friction and loss of draught in passing between them.

There were other defects proved by experience to be serious, and which required removal previous to the extended adoption of the principle. But when to all these troubles is added the difficulty experienced in getting workmen to take kindly to the new order of things, and overcoming their suspicions of the whole system, which they believed would prove injurious to their interests, it will be seen that the strongest convictions of its utility, and the greatest perseverance, were required to keep the matter from being dropped at the outset, and to continue the experiments and remove defects. The generator caused the most trouble. The inclined grate first used required frequent renewal, radiated much heat, and caused great loss of coke in clinkering. The iron bars were then replaced by fire-blocks, but when these also had been partially worn away, they had to be renewed, with a consequent loss of time and money. Another inconvenience experienced with the generators, and especially with those which served for two settings, and were therefore fitted with air inlets on two sides, was the fretting away of the side walls, which were soon burnt through. The fire-bricks could not resist the enormous heat developed where the air entered. This destruction was prevented by giving the walls the shape which they attained by the action of the fire. The upper part of the wall was slightly set back, thus leaving the lower part projecting, so that the air, after entering, was obliged to pass through a layer of coke, instead of going between the wall and the fuel. This device was entirely successful. Again, the air openings in the oven had often been stopped up. This was avoided by leaving a slight projection above them, to prevent any molten material in the oven from trickling down in front of the holes. This seems a very simple matter, but it took a long time to find out. It was, however, still longer before a method was found for preventing the destruction of the fire-blocks which were used instead of a fire-grate; it was at last effected by steam. It is a great step in advance that the generator, at first the weakest part of the whole apparatus, has now been made to last as long as the setting, or even several settings, without any repairs whatever. The simplest way of using steam for this purpose is by admitting water through slits in the bottom of the generator, the slits being too narrow for coke to drop through. This is sufficient to produce a covering of slag on the fire-block, which protects it from fusion by the fire.

All the defects of gas-firing have, in this way, been gradually removed, so that now, after the lapse of five years since the idea was introduced into Germany, the different "systems" which were at first advocated on all sides have grown so much alike that, in principle, there is no great choice between them, and there cannot be much distinctive claim for one over another. The chief difference that still exists in generators is in respect of their being made for a fixed or a varying height of fuel, which is, after all, a very slight distinction, if the latter variety are charged often.

Herr Hasse does not consider that the manner of admitting air to the generator, through side openings, or through the bottom, or by means of a grate, can make any material difference to its working; except as regards the different qualities of coke in respect of the fusibility of its clinker, which may render one form or another locally preferable. Herr Hasse says that he has himself tried all kinds of generators, and has come to the conclusion that when everything is in perfect order and the workmen know their duty, there is hardly any difference as to results, provided that the apparatus is in other respects well made, and the proper height of fuel maintained. He also states that there can be small doubt that the best place for the generator is immediately before the setting, and beneath the floor of the retort-house, although local circumstances may be permitted to control this part of the arrangements.

Herr Hasse maintains that the notion somewhat prevalent abroad—especially, it may be added, here in England—that generator ovens are unsuited for small works, is quite a mistake. On the contrary, he affirms that even where a setting has to stand whole days without working, the principle is specially advantageous, for the valve in the gas-flue has only to be shut, or the door before the generator to be closed, in order to reduce the consumption of coke to a trifle, and to prevent the formation of any clinker. The stoker who would in any other case have to constantly attend to the furnace, may therefore be otherwise employed. Although Herr Hasse does not specially men-

tion it, his argument will also apply to the cessation of work in the retort-house on Sundays, which would not form the least powerful incentive to the adoption of the principle in England.

A great disadvantage to be met with in connection with gas-heated retorts, in requital perhaps of the blessings of high and unvarying heats, is the clogging of the hydraulic main, and the stoppage of the ascension-pipes. Concerning this matter it may be said that in England these troubles are not unheard of, although we do not in general heat retorts with gas. Herr Hasse has nothing particularly novel to advise for their removal. He uses wrought iron ascension-pipes of large diameter—nearly 7 inches—or covers up the cast-iron with non-conducting material, and has designed a special form of hydraulic main with diaphragms to permit of rapid extraction of the thick tar. Yet, as he says, these measures are only palliatives, no radical cure being possible while the cause of the evil is persisted in for other reasons. The non-conducting material advocated by Herr Hasse to economize heat, &c., will stand on vertical surfaces such as the outside of the generator, where it is not exposed to rough usage, but when used on the front wall of the setting it is usual to build the wall hollow, and place the non-conductor between.

Herr Hasse preferred settings of 6, with the old furnace, or direct-acting system of firing, but now finds it of advantage to use settings of 7, 8, or 9. Considerable economy of wages, fuel, and space is thus secured, for the larger number require no more fuel than the smaller, so that 9 is now the standard setting instead of 6, as formerly. Herr Hasse has experienced some difficulty in taking off the ascension-pipes from some of the larger settings when the arches were not wide nor the piers very thick. It appears that his experience has not extended to double retorts, since he speaks of surmounting the difficulty by taking off the ascension-pipes of some of the lower retorts at the back end. It may be remarked that with settings of 10 through retorts, as used in some crowded retort-houses in London, the necessary ascension-pipes are provided for at each end without difficulty, although with a greater number of retorts some trouble might be found in their arrangement.

Returning to the generator, Herr Hasse gives a description of the means he adopts to provide steam for preventing the formation of adhesive clinker, instead of, or sometimes in addition to the water supplied through slit blocks as already described. He merely introduces a pipe bent twice forwards and backwards in the bottom flue of the setting, and water being caused to flow through the pipe from a cistern anywhere overhead, the steam produced therefrom by the waste heat of the spent gases is led into the generator. Herr Hasse uses a flap sight-hole door, with planed surfaces, to secure ease of inspection and preserve a draught-tight joint. He also closes the charging mouth of the generator with a moulded fire-clay lid having rounded edges, dropping into a taper casting, the contact between the fire-clay and iron being amply draught-tight, and an iron shield over all leaving the retort-house floor quite even and unobstructed. He prefers this method of closing the generator to a planed lid.

In concluding his remarks, which are instructive as indicating the nature and extent of the every-day troubles of the users of gas generator furnaces, Herr Hasse expresses the hope that his testimony may help to induce gas managers who have not yet adopted the principle to do so without delay, and assures them that the cost of the necessary structural alterations will in every case be repaid. For small works he advocates the adoption of settings with independent generators, while in larger establishments it will be better to make one generator serve two settings. Single generators require only one to two millimètres draught; double generators will need about twice that draught. With reference to this matter, Herr Hasse lays much stress on the advantages to be gained by the use of delicate pressure-gauges in the ordinary working of the settings, as their indications are of the utmost value in controlling the expenditure of fuel. Finally, all those who propose to introduce gas-firing into works already established are cautioned not to be content with slightly altering the existing retort-benches, but if necessary to build special arches of the strongest description if they desire to obtain the best possible results. With this sweeping recommendation of root-and-branch reform Herr Hasse brings his paper to a close.

Notes.

[*This column is intended to contain miscellaneous memoranda on topics of general professional interest to our readers. We shall be glad to receive for insertion in it any scraps of information, observations of facts, or descriptions of apparatus, &c., which may be worth publication, and yet may not be considered suitable for our "Correspondence" column.*]

Bengel's Spheroidal Gas-Burners.

M. Bengel claims a great and novel improvement in gas-burners of large size, in the construction of his spheroidal burner, by which the gas, instead of issuing from a series of holes, is burnt from a complete circular slit, adjustable in width to any required dimension of flame or specific gravity of gas to be used. According to the statements of the inventor, the spheroidal burner is not liable to be altered in shape by the action of the flame, an effect always observed with ordinary metallic burners, and it is not liable to fracture like steatite burners of large dimensions, while its capability of ready adjustment is an advantage not possessed by burners pierced in the usual way, which must always retain the shape and size at first given them in manufacture. With respect to the illuminating power obtained by the use of the spheroidal burner, M. Bengel states that in the course of a series of experiments having for their object the determination of the condition best suited for the burner, he found that with a consumption of from 75 to 80 litres of gas it gave a light equal to that of a carcel lamp of the Paris type burning 42 grammes of oil per hour; the City of Paris standard Bengel burner consuming 500 litres to give the same amount of light. A tabular statement of the results obtained from two spheroidal burners, the smaller burning about 710 litres and the larger about 900 litres of gas per hour, shows their average consumption to have been about 78 litres to equal the illuminating power of one carcel lamp. M. Bengel alleges that the powerful double or triple Argand burners with cylindrical chimneys which give the light of a carcel lamp for every 75 or 80 litres of gas consumed, have the disadvantage of giving a red light contrasting unfavourably with the electric light, but that his spheroidal burners avoid this defect, so that if they do not excel others in the actual proportion of illuminating power to gas consumption yielded by them, they give a light of higher quality at an equal cost, while the peculiar shape of the flame itself forms an elegant substitute for the cylindrical or flat-shaped flames commonly used.

The Electric Light and Lanterns.

A recent number of *Le Gaz* thus sums up the principal defects of the most renowned systems of electric lighting:—*Jablochkoff Candle:* Too much scintillation; no arrangement for relighting automatically in case of extinction; too deep shadows beneath the lamp. *Werdermann Lamp:* Absorption of a great portion of the lighting power by the upper carbon; too frequent changing of the incandescent carbon; too much shadow. *Jamin Candle:* Too much noise; light too unsteady. *Regulators—Serrin, Lontin, Brush, &c.:* Too costly; too much shadow beneath; delicate manipulation. Therefore, remarks our French contemporary, there is still no really practicable system of electric lighting extant except the Serrin or Brush regulators for lighthouses or large works. Beyond this important negative result, the experience of four years working of the electric light in Paris, although aided by large subsidies, much financial support, and a certain amount of public favour, has produced absolutely nothing. In connection with the subject of electric lighting generally, mention may be made of a novel means of rendering globes for use with the electric light sufficiently opaque to diffuse the light, without robbing it of such a large proportion of its illuminating power as experience has proved to be the effect of ordinary opal glass globes. This improvement, which is due to M. Clémandot, consists in shielding the point of light with a close row of glass tubes filled with spun glass threads, of the kind made by M. Brunfaut, and called glass-silk or glass-wadding, of which the single filaments are so fine that they measure only from four to six 10,000ths of a millimètre in diameter. The glass-wool can be made of any colour, and by increasing or diminishing the quantity of the material in the tubes they can be rendered more or less opaque as desired. The effect of the material in diffusing light is said to be similar to that exerted on the rays of the sun by white clouds. The inventor claims to have saved 30 per cent. of light as compared with opal glass globes. Lamps fitted with the new shades are at present in actual use, and are said to be very successful.

Professor Bell's Photophone.

The invention of the telephone, startling as it appeared at the time, is perhaps more remarkable as having formed the starting-point for many other surprises of a similar character, than for its own sake. The principle of the telephone may be briefly described as the utilization of the property of certain electrical conductors of variation in conductivity in direct proportion to any pressure applied to them from without. This curious faculty having been made serviceable first in the telephone, then in the microphone, phonograph, and their various developments, it was only natural that allied properties of other substances should be investigated by the aid of the lessons taught by the action of these instruments. Selenium has long been known to have its electrical conductivity increased by exposure to light, resuming its normal conducting power when the light is removed. Professor Graham Bell, whose name is well known in connection with the telephone, has for two or three years past been engaged in experimental research into this peculiar quality of selenium, with the avowed object of making a beam of light talk by its aid, and at a recent meeting of the American Science Association in Boston, Mr. Bell read a paper describing at length his experiments in the production and reproduction of sound by light, and the invention by Mr. Sumner Tainter and himself of an instrument for the purpose. Mr. Bell had to begin by improving the normal conductivity of the selenium, which was previously too little for successful introduction into an electrical circuit of any quantity of the substance. He succeeded in constructing small "cells" of selenium, the resistance of which might be denoted as 3, while the best previously made was as 2500 in the dark. On exposure to light the resistance of the cell was diminished about half. By these cells, when suitably connected, the fall of light—the blow struck by a ray—was rendered distinctly audible. The next step was to make the intensity of the light undulate in accordance with the vibrations of the human voice, and the consequence was that the undulations were found to be faithfully reproduced in the telephone. The apparatus used in order to effect this is sufficiently simple. A plane mirror of flexible material, such as silvered mica or microscope glass, is employed to reflect the light—sunlight or a strong artificial light, concentrated upon it by a lens. The speaker's voice is directed against the back of this mirror, which is thrown into vibrations in the same way as the diaphragm of a telephone, and communicates these vibrations to the beam of light. The light reflected from the mirror is, after passing through a second lens, received at the distant station by a parabolic reflector, in the focus of which is placed a selenium cell in circuit with a local battery and

telephone. With instruments arranged as above described, Mr. Bell states that a number of trials have been made, over distances too great to permit of sounds being heard directly through the air. The greatest distance mentioned is 213 mètres, or about 230 yards. Mr. Bell believes that similar results may be obtained at whatever distance a beam of light can be flashed from one observatory to another. An oil or gas light may be used to transmit audible speech in this way. It is difficult to say to what these researches of Mr. Bell may ultimately lead; one result besides the principal one in question having been the discovery that other substances than selenium are susceptible to light. He has found this property in gold, silver, platinum, iron, steel, brass, copper, zinc, lead, antimony, German silver, Jenkins's metal, Babbitt's metal, ivory, celluloid, gutta-percha, hard rubber, soft vulcanized rubber, paper, parchment, wood, mica, and silvered glass. Carbon and thin microscopic glass are insensible to light. Whether anything Mr. Bell has done in this direction will lead to the discovery of a method of measuring the intensity of a beam of light, and thus help forward the search for a positive photometer, remains to be proved.

The Best Form of Lightning Conductor.

The subject of lightning conductors has attracted much attention of late. The comparatively novel question as to the influence of masses of metal and lines of gas and water tubing, in protected buildings, has been satisfactorily settled; and the advisabilit yof connecting the earth terminals of lightning conductors to gas and water mains buried in the ground has also been debated, and proved affirmatively. The old problem as to the best form of the conductor itself—whether it is best round, flat, hollow, or solid—has been revived by Mr. W. A. Preece, in a communication read by him before the Mathematical and Physical Science Section of the British Association, at their Swansea meeting, and his experiments therein described should go far to settle the question for the future. There has been so much disputation on this subject among practical electricians, and the public have been so mystified by the rival lightning-rod men, that there has been much danger lest the adoption of necessary precautionary measures for the protection of buildings from lightning should be left to the direction of quacks, or neglected altogether. Mr. Preece announces as the result of his experiments with conductors of various forms, subjected to discharges of artificial lightning produced from the most powerful battery available, that change of form produced no difference whatever in the character of the discharge, and that it depended simply on mass. It therefore appears proved that discharges of electricity of high potentials obey the law of Ohm. Hence, extent of surface does not favour lightning discharges, and thus no more efficient lightning conductor can be devised than a simple cylindrical rod or a wire rope.

Exalted Electric Lighting.

Experiments have recently been made in France and America to determine the practicability of lighting towns by means of lofty electric light towers, but with only partial success in either instance. At Rouen, during the *fêtes* of July 13 and 14, eight powerful electric lights were placed on the spire of the Cathedral, with the intention of illuminating the town. Though the quantity of light produced was estimated at 5000 carcel lamps, the effect was practically *nil*. The spire merely appeared to have a huge lamp on it, which seemed to throw its light beyond the town rather than in the neighbourhood of the Cathedral. The experience of the Americans in the same direction was somewhat similar. On Nantasket Beach, near Boston, the Northern Electric Light Company erected three wooden towers, about 100 feet high, and mounted on each tower a circle of 12 Weston's electric lamps, each lamp being estimated at 2500-candle power. The towers were only 500 feet apart, and formed a triangle, so that the light (computed) of 90,000 candles was concentrate within a limited area. The motive of the Electric Light Company in arranging this costly experiment was to prove the feasibility of their proposal to light towns with almost noonday brilliancy from towers of similar design, numbering four to the square mile, and each mounting lights aggregating 90,000-candle power. On the occasion under notice, the current was produced by three Weston machines, using 36-horse power, and the whole of the lamps burned well and steadily throughout the evening, with only one slight flicker. The light yielded was just sufficient to enable two sets of base-ball nines to play in the centre of the triangle, but on account of the uncertain nature of the light, resembling that of a full moon, the games were poorly played, and there was very little light given beyond a circle of one-eighth of a mile radius.

West Kent Gas Company.—The half-yearly meeting of this Company was held on the 20th inst.—the Vice-Chairman (Mr. J. Page) presiding, in the absence, through illness, of the Chairman (Mr. J. J. Stevens). The Secretary (Mr. R. P. Keys) read the notice convening the meeting and the report of the Directors, which stated that a profit of £3102 7s. 8d. had been made during the past half year, which was £249 0s. 8d. more than during the corresponding period of last year, and recommended the payment of the statutory dividend of 10 per cent. on the original shares, and 7 per cent. on the new capital, carrying forward a balance of £1425 7s. 3d. The report was adopted, and the dividends were declared. Mr. G. Anderson (a Director) proposed a vote of thanks to the officers of the Company, remarking that Mr. Stevens, jun., their Engineer, had many difficulties to combat with and duties to perform, in the Company's relations to the different parochial authorities in their district, which did not usually fall within the province of a gas engineer. The motion was carried; and Mr. F. J. J. Stevens, in responding, referred to the difficulty in procuring a fair price for residuals, the West Kent Company's works at Erith being so near the Beckton Gas-Works that the price of coke was always very low. A vote of thanks was passed to the Chairman and Directors, and the meeting terminated.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

GAS APPARATUS EXHIBITIONS.

Sir,—We notice in your last issue some correspondence upon the subject of gas apparatus exhibitions, and also your editorial remarks thereon. As allusion is directly made to our firm, we trust you will allow us space to say that we know of no such association as described by your correspondent, the members of which wish "to keep all the gas apparatus exhibitions in their own hands."

We should be the last to give countenance to any combination which had for its object the restriction of fair competition. It is true that an association has been formed, but with a purpose widely differing from the above. Its sole object has been to raise the character of these exhibitions, which were fast drifting into "Cheap Jack" bazaars for the sale of odds and ends in no way connected with gas. Another and not less important object has been to put a check upon certain manufacturers whose commercial morality in the matter of piracy of designs, and the means adopted for securing awards, would scarcely bear the light of day. We will cite an instance of this, and leave it to your readers to judge whether respectable firms should quietly allow this sort of thing to go on unchecked.

A certain firm (the name we withhold for obvious reasons) obtained three medals at one exhibition for cookers, which were certainly marvels of cheapness. The medals, however, being awarded, the object for which the cookers were made was answered, and orders for the stoves at the prices marked in the catalogue were refused in more cases than one. We are in a position to prove not only this, but also that it was well known to the manufacturers *employés*, before the stoves were sent to the exhibition, that they were priced below cost, and that orders were not to be taken for them. This same firm is now advertising that they have received a medal, when no such medal has been awarded. This is an isolated case, but we could name many others were it necessary. Indeed, disreputable practices of this kind have become so common at gas apparatus exhibitions, that, if they cannot be checked, men of honour will be compelled to withdraw from them.

We could have wished that your editorial had been made upon a review of the two sides of the case, and not upon the *ex parte* statements of your correspondents. We are, however, sure that were you or your readers "behind the scenes," the action of the association would be endorsed by all who have any desire for the maintenance of commercial morality.

Birmingham, Sept. 25, 1880. John Wright and Co.

[This letter is as vague as Messrs. Beverley and Wylde's was explicit. That communication made a definite statement, citing time and place, which Messrs. Wright and Co. do not notice. They admit that an "association" of gas stove makers exists, but assert that its objects are different to that described by our earlier correspondents. We may mention that we have received confirmation of Messrs. Beverley and Wylde's statements, since publishing their letter. But granting that the "association" was originally formed with good intentions, which have since, perhaps, become corrupted, we cannot admit that exhibitors are the proper parties to assume the direction of exhibitions by which they hope to benefit in awards or business. At least, if the manufacturers themselves are to conduct the exhibitions which they patronize, the fact should be advertised, in order that the public may form their own opinion on such an arrangement. But, upon the whole, we think the promoters of exhibitions should retain the management of them, and we therefore repeat our warning contained in last week's "Circular."—Ed. J. G. L.]

Legal Intelligence.

LIVERPOOL BOROUGH SESSIONS.—Wednesday, Sept. 22.

(*Before Mr.* J. B. Aspinall, Q.C., *Recorder.*)

THE APPOINTMENT OF A PUBLIC ACCOUNTANT OF THE LIVERPOOL CORPORATION WATER ACCOUNTS.

It may be remembered that at the last April sessions (see Journal, Vol. XXXV., p. 517) an application was made to the Recorder for the appointment of a competent Accountant to examine the Liverpool Corporation water accounts, pursuant to the Act 10 & 11 Vict., cap. 261, sec. 127. The application was acceded to, and Mr. M'Quie appointed. His report has since been received, and to-day the matter was mentioned.

Mr. Segar said it was very desirable, in the interests of those persons on behalf of whom he appeared, that the matter should be investigated at once, because the water-rate had already been laid for 1880; and though the Recorder might see fit to reduce the rate for this year, the sooner it was done the better, because many persons were in the unfortunate position of having already paid their rates.

The Recorder: Why do you say "unfortunate"?

Mr. Segar replied that he said so because some of those who had paid might be entitled to pay a less sum. The applicants in those cases were always in a very great difficulty, because the accounts were not filed with the Recorder till after the rate was laid, and therefore it was perfectly impossible to make the application in time to have the rate reduced before it was laid. How the ratepayers who had already paid their rates would recover, he did not know, and for the existing year he believed the mischief was already done. He understood that Mr. M'Connell, who appeared for the Corporation, was anxious for an adjournment, because the Corporation had only mastered the report, and as he (Mr. Segar) understood could not master their own accounts. As his clients had gone to the trouble and expense of the inquiry, he hoped the Recorder would only postpone the question on the Corporation paying all the costs incurred in preparing to lay the whole case before him at the present sessions. An adjournment must also be on the understanding that it would not prejudice the right to have the rates reduced.

Mr. M'Connell, who appeared for the Corporation, said they had not had a full copy of the accounts, and were not ready to go on. An application had been made to examine the accounts by Mr. Pierce, and the Town Clerk replied asking him to consent to an adjournment of the application till the November session. He (Mr. M'Connell) did not know that an order made could affect the rate already passed.

The Recorder said this was a matter upon which he would not express any opinion at present. Mr. Segar had spoken about people getting their

rates back again, and he thought anything of this kind ought not to be prejudiced. It was only reasonable, too, that the Corporation should pay the costs occasioned by an adjournment.

This condition was ultimately assented to.

BERKSHIRE PETTY SESSIONS.—SATURDAY, SEPT. 25.

(*Before Captain* BULKELEY, *Chairman, and a Bench of Magistrates.*)

THE DRAINAGE OF WINDSOR.

At the Windsor Town Hall, this day, the Corporation of Windsor, acting as the Urban Sanitary Authority, were charged by the Thames Conservancy with polluting the river by causing or suffering offensive and injurious matter to flow into the stream near the sewage works at Old Windsor, on the 14th of June last.

Mr. G. PAYNE represented the Thames Conservancy; and Mr. W. D. GREENE appeared for the Windsor Urban Sanitary Authority.

Mr. PAYNE observed that the proceedings were instituted in accordance with the provisions of the 29 & 30 Vict., cap. 89, secs. 64 and 65, which set forth that when any sewage or any other offensive or injurious matter was caused to flow into the Thames, the Conservators were required to give notice in writing to the person or body so offending to stop the nuisance within not less than twelve months or more than three years, and that persons or bodies failing to discontinue the pollution after such notice were liable, upon conviction, to a penalty not exceeding £100, and a further penalty not exceeding £50 a day for every day during which the offence was continued.

The facts of the case, as shown by the evidence, were as follows:—Mr. More, Assistant Engineer to the Conservators, went to the Windsor Sewage Works on the 14th of June last and took a sample of the effluent water, which was said by the Analytical Chemist of the Conservators to be weak sewage, which had been mixed with a larger proportion than usual of water, and did not show any indication of having been treated by any precipitation process, and would seriously contaminate the river. A beer-can was let down from the bank and the liquid caught as it flowed out of the outfall-pipe. It was then put in a large bottle, which was taken away, and not sealed down till the following day, when it was sent to the Analytical Chemist, whose entry of its reception was dated a day later, the 16th. Mr. G. W. Wigner, Analyst to the Thames Conservancy, was examined upon his analysis, and said that the liquid, when it came to him, was opaque, and offensive and injurious. He produced some of the liquid, which he said had become clear through exposure to the air. Sulphuretted hydrogen was present, which was the most objectionable gas given off by any sewage, and when run into water was dangerous to life. He would not say that it would be dangerous three miles down the river, or even at 100 yards, but this would depend upon the nature of the outfall. It was admitted that there had been previous and subsequent analyses without anything amiss being discovered.

At the conclusion of the case for the prosecution,

Mr. GREENE objected, first, that there was no evidence that the prosecution was authorized by the Thames Conservators; and, secondly, that the notice which the Conservators had served upon the Board, as required by the clause under which the proceedings were taken, and which was now relied upon, was given in 1867, before the present works were in existence, and related to an entirely different state of things. The Magistrates, he said, decided the first point against the Board, and the second in their favour. The prosecution then chose to proceed under another clause, which imposed a penalty only where the act was committed without lawful excuse. He then entered upon the defence on the general merits. He said the Sanitary Authority had made a *bonâ fide* attempt to carry out the requirements of the Conservators, and had incurred an expense of over £40,000 in doing so. They had adopted the system of Professor Hillé, which was the most approved system of the present day, and they had every reason to believe that the Thames Conservators were satisfied, as the works had gone on for some time without any fault. He complained that the sample was taken in a very careless and unsatisfactory manner, and that the officials of the Conservancy had taken it without communicating with the officers of the Board. The Board were, therefore, unable to satisfy themselves that the sample was fairly taken, or to have an independent analysis made at the same time. He suggested that the liquid which had been subjected to analysis was stagnant water from the Thames, which was indicated by the presence of quartz, which would not be found in the sewage, and remarked that certain works were in progress at the Ham, which were being carried out at the express requisition of the Local Government Board, and which were just being completed. Those works were the construction of additional filter-beds; and while these were in progress the escape of a small quantity of sewage might have taken place. If so, he submitted that, as the Board were acting upon the requisition of the Local Government Board, they had sufficient lawful excuse.

Mr. *Davison*, the Borough Surveyor, and Mr. *Sainty*, the Resident Engineer, were examined, and proved that on the day in question the quantity of chemicals used for purifying the sewage was in excess of what was required, and that everything was done that was possible to prevent the flow of impure matter into the Thames.

The CHAIRMAN said the Bench found that offensive matter had been permitted to flow out of the pipe into the river. It would have been more satisfactory if the sample had been taken with more care, and if the officers of the Thames Conservancy had gone to the works with some member of the Corporation. The Magistrates would fine the Corporation £5.

Mr. PAYNE asked for costs, which he said would be about ten guineas.

Eventually the Bench allowed five guineas for the purpose.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

Lieut.-Col. Bolton's report on his examination of the water supplied by the Metropolitan Water Companies during last month says that the state of the water in the Thames at Hampton, Molesey, and Sunbury (where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, Chelsea, and East London Companies are situated) was bad from the 1st to the 3rd of August, when it became good, and continued in that condition for the remainder of the month. The highest flood state of the river at West Molesey during the month was 1 ft. 3 in. above summer level, and the lowest 2 inches below the summer level, the rainfall being 0·84 inch. The water in the River Lea was good during the greater part of the month. [These remarks refer to the condition of the water previous to filtration.] Notwithstanding that the water at all the Thames intakes was in a better condition during the month of August than in July, the water supplied was slightly coloured and tanned by organic matter, principally arising from vegetation brought down by the flood waters in the early part of the month. Generally, however, the water was efficiently filtered, although the filtration failed to free the water from the effects of the organic matter above referred to.

HARROW DISTRICT GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held at the Guildhall Tavern, Gresham Street, E.C., on Wednesday last—JAMES GLAISHER, Esq., F.R.S., in the chair.

The ENGINEER and SECRETARY (Mr. James L. Chapman, A. Inst. C.E.) having read the advertisement convening the meeting, the following report and accounts were presented:—

The Directors have pleasure in submitting to the Proprietors the accounts for the half year ending June 30, 1880.

The price of gas has been reduced 3d. per 1000 cubic feet from the 1st of July—viz., in the Harrow town district to 5s. 9d., and in the outlying districts to 6s.

The balance of the profit and loss account is £1137 2s. 3d. The Directors recommend that a dividend at the rate of 6 per cent. per annum (free of income-tax) be paid, and that £150 be written off the parliamentary expenses, leaving a balance of £12 2s. 3d. to be carried forward to the next account.

[The total authorized capital of the Company is £56,250—viz., £30,000 entitled to 10 per cent., £15,000 of 7 per cent. shares, and £11,250 of loans. The whole of the 10 per cent. shares are paid up, and £7500 of the loans; while there still remains £12,500 of the 7 per cent. capital to be issued. The expenditure on capital account during the half year was £113 14s. 8d., making a total to date of account of £38,628 11s. 7d.]

Revenue Account, for the Half Year ended June 30, 1880.

Dr.				Cr.			
Manufacture of gas—				Sale of gas—			
Coals, including all expenses	£983	14	1	Lady-day quarter:			
Purifying materials, water, oil, &c.	34	10	5	Private rental—			
Salary of Engineer	125	0	0	5,031,900 cubic feet at 6s.	£1509	11	0
Wages	211	6	3	781,600 cubic feet at 6s. 3d.	244	5	3
Works, machines, and apparatus — maintenance of, repairs, and labour	174	2	4	Public rental & under contracts	151	13	6
Distribution of gas—					£1905	9	9
Mains and service-pipes, repairs, maintenance, renewal, and labour	51	2	0	Midsummer quarter:			
Meters, renewing, repairing, and refixing	11	11	3	Private rental—			
Public lamps—				2,409,900 cubic feet at 6s.	£722	19	3
Lighting	33	10	0	349,500 cubic feet at 6s. 3d.	109	4	7
Rents, rates, and taxes—				Public rental & under contracts	76	12	0
Rents	10	14	0		908	16	0
Rates and taxes	101	5	0	Meter-rental, the half year	78	18	6
Management—					£2893	4	3
Directors and Auditors allowances	150	0	0	Residual products—			
Salary of Secretary	25	0	0	Coke, less labour and cartage	366	3	7
Collector's commission	30	0	0	Tar, " "	74	14	5
Stationery and printing	22	5	5	Sulphate of ammonia	31	5	9
General establishment charges	76	14	5				
Sundries—							
Bad debts	4	15	8				
Total expenditure	£2045	10	10				
Balance carried to profit and loss account	1310	0	2				
	£3355	11	0		£3355	11	0

The CHAIRMAN, in moving the adoption of the report, said the balance-sheet had doubtless attracted the Shareholders attention. They saw the state in which their business was, and they would notice that it was merely a link in the old chain, exhibiting stagnation to a large extent—holding their own, but doing very little more than this. They would remember that the first, second, or third time he addressed them he said there did not seem much "go" in the town of Harrow, and from that day to the present it appeared to have been in a stagnant condition. They might also remember that on different occasions he had spoken of the possibility of a railway coming to Harrow, as such a thing was whispered about. Then he spoke a little more confidently on the matter—that it was really determined upon—and then he became almost afraid to speak about it. It was now, however, his great pleasure to state that the railway was an established fact. From the beginning of August the line had been open, and a most admirable service had been run—a half-hourly service—and this had been continued ever since. He had been down to Harrow several times by it, and he felt quite confident that it must give a stimulus where one was so greatly needed, and every interest would be benefited by it. He had been informed that many inquiries had been made for houses up to £50 rental—more in the past month than for several years previously. They knew that if a demand for gas came it could be supplied, and he looked forward with confidence to their having to speak of Harrow, not as a stagnant place, but as one showing vigour; and if so, they would be enabled to charge less than 6s. per 1000 cubic feet, and should there be a large demand they would be enabled to supply it at the price which he should like to see them able to charge for it. They had already given notice of a reduction, and had thus broken through the 6s. He remarked that when he was under examination by the House of Commons Committee in connection with the Company's Bill, it was said that the Company would never break through their 6s. charge till they paid 10 per cent. dividend. He told the Committee that they would, as soon as they earned 6 per cent., and this promise had now been redeemed. He hoped and trusted that if, as he had no doubt, they obtained their coals at a lower rate, they would be enabled before many months to announce a still further reduction in the price of gas; for he knew by experience that where they could see their way safely, every reduction was followed by a larger consumption, and that companies usually did not feel any ill effect from such reduction. This would be the spirit in which they would act, but so as to maintain their 6 per cent. dividend. With respect to the illuminating power of the gas, he could assure the Shareholders that from the reports given to him, and also from all he knew, the gas the Company supplied was of very high illuminating power, and also of fair purity. He did not mean to say that the sulphur in it was under 20 grains per 100 feet, but it was considerably under 40. Their efforts had been directed to supplying a pure article, and something that would give satisfaction to every one who used it. There had been difficulties in connection with their district. There was a large firm who used to employ some 300 men, burning gas day and night, and now they employed only very few, and he believed it was contemplated to close their works at Greenford. The consumption of gas by this firm used to be fairly large, but, of course, it had fallen considerably. Still, this was one of those difficulties which a small concern like the Harrow Gas Company had to contend with; but the opening of the railway would overshadow these and other troubles, and he had every reason to believe that the Company would progress in a very satisfactory manner.

The DEPUTY-CHAIRMAN (Mr. John Chapman), in seconding the motion, said he quite agreed with the Chairman that the prospect before the Company was encouraging, as the railway was now an accomplished fact, and they had heard that there were inquiries for houses, and that houses in the vicinity of the station which had stood empty for years had been taken up. There were now hardly any unoccupied houses in the neighbourhood, and the price of land had risen from £250, £300, or £400, to nearly £800 per acre. It therefore seemed to him that they were threatened with a building innovation, which they would encourage as far as they could as Directors of a Gas Company. They rejoiced at every increase in

building in the neighbourhood of the railway station, and there was a prospect that the increase would be larger. He had come to that meeting in about three-quarters of an hour—from Harrow to Moorgate Street; and with such a convenient mode of getting into the Metropolis, there could be no doubt that a great many persons would go and reside in the neighbourhood, which, in his opinion, was surpassed by none about London. He thought the Shareholders had every reason for taking a hopeful view of things. He endorsed all that had been said by the Chairman, and thoroughly agreed with him they would give a cheaper gas as soon as the opportunity offered itself. He thought that day would not be very far distant; but he did not recommend any reduction of the price that would at all endanger their 6 per cent. dividend, or even a little more. They were going to try the effect of the reduction to 5s. 9d., and he hoped that it would give them encouragement to proceed as the Chairman wished.

Mr. Corbet Woodall thought the Shareholders must congratulate the Directors on the report. He had read it with unusual interest, because he noticed that with a diminished balance they had had the courage to announce a reduction in the price of gas. Of course he could have wished to see the balance increasing rather than diminishing, but he thought the Directors were to be congratulated on the courage which had led them to adopt the course they had. It seemed to him quite clear that what the Company wished to do was to increase the consumption, and if, as he had no doubt, the reduction in the price helped that consummation, they would have to congratulate the Board at a very early date. The necessity for increasing the consumption was evidenced not only by the amount required to pay the dividend on the capital, but also the establishment charges and costs of that kind, which were fixed, and would not vary with a largely increased consumption. It seemed to him, in going through the accounts, that in the item of management it would be quite possible to save the equivalent of 1 per cent. by an increased consumption of gas. He thought that the general results obtained by the Engineer were very much to his credit, and that the whole balance-sheet—except as regarded their being at present too large for their consumption—was matter for congratulation. He trusted that the cost of the coal would be reduced by means of the new railway, and that from the same cause they would be able to obtain better results per ton of coal for the residual products, as to which there seemed to be room for improvement. He had no doubt that the Company would be able to maintain their 6 per cent. dividend, and that the interests of the Shareholders would be as carefully looked after in the future as they had been in the past.

The motion was carried unanimously, and the dividend recommended in the report was declared. It was also unanimously agreed to write £150 off the parliamentary expenses.

The Chairman said the fact that they were able to pay such a dividend under the circumstances of a reduction in the amount of gas consumed, arising mainly from the economy of the North-Western Railway Company and the failure of the large consumption by the firm he had mentioned, reflected much credit on the Engineer. But for his great attention, and the ability he had displayed, they would scarcely have been in so favourable a position as they were. He moved a vote of thanks to the Engineer and Secretary.

Mr. Kilsby seconded the motion.

Mr. C. Horsley, C.E., said any suggestion made by the Works Committee was always carried out by the Engineer in a most satisfactory manner. He was very pleased to hear the remarks of Mr. Woodall, and, as he had pointed out, there were, no doubt, certain improvements to be made. The new railway would now enable the Company to get their coals much more easily, and they would have facilities, without much expense, of getting Yorkshire coal.

The motion was carried unanimously.

Mr. J. L. Chapman, in reply, said that he would have much liked to see the same rate of increase as when the Company started—about 6 or 7 per cent.; but during the past year or two they seemed to have been standing still, for reasons they hardly knew. He believed that the new railway communication would cause many people to become residents, and he trusted this, with other circumstances, would lead to an increase in the Company's business. A junction was about to be made, which would bring their coals a mile nearer to the works, and this would save much cartage.

A vote of thanks was then passed to the Auditors, and acknowledged by Mr. F. G. Fenton.

Mr. Woodall proposed a vote of thanks to the Chairman and Directors, expressing a hope that the Chairman would soon have his desire realized, and see a large increase in the consumption of gas.

Mr. Cutler seconded the motion, and it was carried unanimously.

The Chairman, in reply, said that neither he nor his colleagues would hesitate to give their best efforts to promote the welfare of the Company. They would not relax in their labours until they had a large increase both in the consumption of gas and in the dividend.

The proceedings then terminated.

Reduction in the Price of Gas at Liskeard.—It is announced that a reduction of 9d. per 1000 cubic feet has been made in the price of gas supplied to Liskeard; the reduction to date from Midsummer last. The price henceforth will be 4s. 3d. per 1000 feet.

Milnrow Gas Company.—The ordinary half-yearly meeting of this Company was held on Monday, the 6th inst.—Mr. Emanuel Clegg presiding—when the report of the Directors, recommending a dividend at the rate of 8 per cent. per annum free of income-tax, was adopted. The report stated that the net profit of the past six months was £629 17s. 7½d. Out of this it had been resolved to place £50 to the contingencies reserve-fund, which now amounts to £1100, and thus leave (after the payment of the dividend) £59 17s. to be carried to next account. The capital outlay to June last was £14,403 7s. 10d.; and the total receipts of the past half year, £1438 4s. 11d. Of this sum, the major part (£1253 14s. 9d.) was from sales of gas and meter-rent; only about £180 being realized from residuals. Votes of thanks were passed to the Chairman and Directors for their past services, and to the Secretary, Mr. Benjamin Turner.

Lindfield Gas Company.—The report and balance-sheet of this Company for the year ending June 24, 1880, show that a profit has been made on the year's working of £97 14s. 11d. This, with £31 11s. 5½d. standing in the Company's favour last year, makes a total of £129 6s. 4½d. gross profit. Out of this sum the Directors recommend a dividend of 2s. per share, and the payment of £40 off the borrowed money. The capital account shows on the debtor side an income of £1657 12s. 7d. (with the balance of loan £240). The original cost of the works was £1407 12s. 7d., and the additional works (1878) cost £250. The revenue account shows an income of £532 3s. 2d.; the disbursements amounting to £434 8s. 3d., leaving a balance profit of £97 14s. 11d. The profit and loss account stands thus: Balance, £96 13s. 5½d.; outgoing dividends, 2s. per share, £25 2s.; instalment of loan, £40; balance, £31 11s. 5½d. There is, therefore, a balance of £31 11s. 5½d., and a profit (1880) of £97 14s. 11d.; making a total profit of £129 6s. 4½d.

SHREWSBURY GASLIGHT AND COKE COMPANY.

The Annual Meeting of this Company was held on Thursday last—Mr. A. G. Brookes in the chair.

The Secretary and Manager (Mr. W. Belton) having read the notice convening the meeting, the following report of the Directors was taken as read:—

The Directors herewith present to the Proprietors the annual statement of accounts for the year ending June 30, 1880, duly examined and certified by the Company's Auditors, and recommend that the authorized dividend be declared.

There has been an unprecedented increase in the demand for gas during the past year, owing, as is believed, partly to the extremely low price which the Company are now charging, and partly to the justly increasing favour with which gas cooking and heating appliances are regarded; your Directors therefore found themselves under the necessity of immediately erecting another gasholder, which is now in satisfactory progress.

A sale of the remaining lots of stock, authorized in 1878, was held on the 3rd of February last, and realized £4650. A portion of the stock authorised at the extraordinary meeting held on the 17th of June last has been sold by auction since the closing of these accounts, and the remainder has been taken up by Proprietors under the 15th section of the Company's Act.

The working during the past year has been satisfactory, and the quantity of gas unaccounted for has been reduced from 7·15 per cent. in the previous year to 5·31 per cent. Your Directors have been enabled to make favourable prospective contracts which will ensure the continued prosperity of the Company, and the earning of full dividends upon the increased capital.

Two Directors, Mr. A. G. Brookes and the Rev. N. Cooper, retire by rotation at this meeting, and are eligible for re-election.

Mr. Onions, one of your Auditors, also retires, and offers himself for re-election.

[The Company are authorized to raise £80,000 of 7½ per cent. stock and £16,000 of loans. They have issued £46,500, the net premiums on the sale of which amounted to £3602 6s. 7d., and have borrowed £8500 at 4 and 4½ per cent. The total expenditure on capital account to June 30 last was £60,636 8s. 11d., £4820 15s. 9d. of which was added during the preceding twelve months. The balance of profit and loss account, after meeting interest on loans and the interim dividend paid in March last, is £5563. The reserve-fund amounts to £4681 17s. 1d.]

Revenue Account.

Dr.					Cr.			
Manufacture of gas—					Sales of gas at 3s. 4d., 3s. 2d., and 3s. per 1000 cubic feet, up to Sept. 30, 1879, and at 3s. per 1000 feet since that date			
Coals, including carriage	£6,371	11	3			£11,188	12	7
Purifying materials and labour	235	8	7		Public lighting and under contracts, including lighting, extinguishing, removals, and repairs	1,451	7	10
Salaries of Engineer and Officers at works	266	0	0			£12,640	0	5
Wages, oils, and sundries at works	1,017	12	3		Rental of meters	394	12	2
Repairs and maintenance of works and plant	1,808	3	5		Residual products—			
Distribution of gas—					Coke and breeze	£1,430	7	5
Salaries of Inspectors and Clerks in light office	208	19	0		Tar	1,123	8	7
Repairs, maintenance, and renewals of mains and service-pipes, &c.	492	14	11		Ammoniacal liquor	602	11	2
Repairing, renewing, and re-fixing meters	180	9	7		Lime and sundries	134	19	3
Public lamps—						£3,291	6	5
Lighting and repairing	424	19	9		Less labour and cartage	233	16	10
Rents, rates, and taxes	568	10	9			3,057	9	7
Management—					Fittings	1,316	4	6
Directors allowances	175	0	0		Rents	20	1	0
Salaries of Secretary and Clerks	231	10	6					
Collector's salary	127	10	0					
Stationery and printing	123	9	8					
General establishment charges	132	13	2					
Auditors	21	0	0					
Insurances	18	15	0					
Fittings	1,148	17	1					
Bankers commission and interest	61	2	1					
Bad debts, discounts, &c.	107	12	4					
	£13,721	19	4					
Balance	3,706	8	4					
	£17,428	7	8			£17,428	7	8

The Chairman said the report was a very satisfactory one, and was remarkable more particularly from the increase recorded in the consumption of gas, which was in excess of any former year. Some years ago he mentioned to the Shareholders that the increase in the consumption of gas for 20 years was on the average 2½ million cubic feet per year, and on that occasion he ventured to predict that it would be 3 millions or 4 millions. He was glad to say this estimate had been exceeded, for last year the increase was more than 4 million cubic feet, and this year it had been between 5 million and 6 million cubic feet. This was a very important circumstance, in that the increase was such as to render it absolutely necessary that immediate steps should be taken for the erection of an entirely new gasholder, and this was already in process of erection, and such good progress had been made that the Directors now felt sure there would be no misfortune connected with it. This was very satisfactory, when it was considered that the ground around Shrewsbury was so treacherous; and great precautions had to be taken by Mr. Belton, who perpetually visited the ground, to see that no accident of a great extent happened. They had certainly met with a deal of running sand, and came upon springs which had to be at once stopped, but all the difficulties had been successfully overcome. Referring to the reduction recently made in the price of gas, he said it had reduced the income of the Company by £800, but the Directors felt sure the reduction would be appreciated by the consumers; and this had resulted in increasing the consumption to such an extent that it had recouped the Company to the extent of an additional income of £550, more or less. They had also obtained 96 new consumers, and the Corporation had put up 60 new lamps, which they would not have done if it had not been for the reduction in the price of gas. Another good thing was that the loss by leakage had been reduced compared with what it was a few years ago. It was now reduced to 5·31 per cent., and that alone saved 1½ million cubic feet of gas a year. He therefore hoped that with an increased revenue, with expenses lessened, and with a better market for residuals, the Company would hold the very excellent position they had held up to the present time. They had no difficulty at any time, when their stock was offered to the public, in getting it taken up, and the prospects of the Company were, as far as he could see, as good as could almost be desired. He concluded by moving—"That the report of the Board of Directors, together with the accounts as examined and certified by the Auditors, be received and entered on the minutes."

Mr. G. E. Leake seconded the motion.

Mr. Hirst said he could with the greatest satisfaction bear testimony to the excellent way in which the new works were being erected. Where other people had failed Mr. Belton had succeeded, and it was nothing but right that he should bear his testimony to this fact.

The motion was then unanimously agreed to.

The Chairman next proposed a dividend, for the year ending June 30 last, at the rate of 7½ per cent. per annum upon the Company's stock—deducting the interim dividend of 3¾ per cent. paid in March last.

Mr. BENTLEY seconded the motion, which was agreed to; after which the retiring Directors and Auditor were re-elected.

Mr. T. F. POOLE moved that the cordial thanks of the meeting be given to the Directors, and to Mr. Brookes, the Chairman.

The motion was seconded and carried.

The CHAIRMAN, in returning thanks, said the Directors all took the deepest interest in, and watched the new works closely, as they progressed, and if this did no other good, it acted, he thought, as a stimulant to the men employed. There was nothing they saw at the works but what was carried out in the best manner, and nothing had escaped their attention. As a further security against contingencies, he might say that they were insured to a very large amount. Some two of the Directors took great pains, by going over the works, to see that everything was included in the insurance, and they were now in a position to say that in case any accident should unfortunately befall them, the Company would actually sustain very little loss. The reserve-fund had also been increased, and now approached £5000, so that the Proprietors would see that the Directors were very watchful to enable them to keep their position, and if any disagreeable occurrence arose, the Shareholders might be sure that these precautions would enable them to pay the usual dividend. He afterwards proposed a vote of thanks to the Manager and Secretary, saying that the Board had now had an opportunity of testing his services, as he had been more than twelve months their officer, and he (the Chairman) could only say this, that as far as the Directors could judge he gave every satisfaction, and he could further say of him that since he had been Manager he had done his work in a most excellent manner. He had therefore great pleasure in proposing the vote of thanks.

Mr. J. H. LEAKE seconded the motion, which was carried.

Mr. BELTON said he was very highly gratified at the kind appreciation which had been expressed of his services. With so kind and considerate a Board of Directors and the efficient officers under him, he could do no other than exert himself on behalf of the Company. The officers, he was sure, took a real interest in their work, not so much for the pay they received as for the sake of the work itself. It was his endeavour at all times to give satisfaction to the Company and to the public, and if he had succeeded he was very much gratified, and hoped he should be able to continue to do the same for some time to come.

The meeting then terminated.

DUKINFIELD, DENTON, AND HAUGHTON LOCAL BOARDS GAS SUPPLY.

The Accounts of the Joint Gas Committee of the above-named Local Boards, for the year ended the 30th of June last, were issued on the 9th inst. From them it appears that the gas manufactured during the twelve months amounted to 81,038,000 cubic feet; which, as there were 8482 tons of coal and cannel carbonized, showed an average yield of 9610 cubic feet per ton. The gas sold and used in the works was 60,994,634 feet; leaving for leakage, &c., 20,043,366 feet.

The capital expenditure to June 30, 1879, was £9531 7s. 3d.; while £1573 17s. 11d. was expended during the last year. The balance of the revenue account (which is appended), £4670 1s. 6d. was appropriated as follows:—£195 16s. 8d. for interest on loans; £2937 10s. for annuities; and the remainder, £1536 14s. 10d., for interest to the Dukinfield Local Board, £500, and a similar amount between the other two Boards, the overplus of £536 14s. 10d. being carried to the reserve-fund, which now amounts to £1646 2s. 2d. The following are the items of the revenue account:—

Expenditure.

Manufacturing expenses—					
Cannel and coal	£1305	9	1		
Wages for stoking	1135	19	0		
Purifying materials and labour	97	16	2		
Water	4	16	5		
Salaries	268	10	3		
Repairs of works, materials, and labour	573	1	8		
Repairs and renewals of retorts	409	0	6½		
General expenses	325	6	3		
				£7,119	19 4½
Distributing expenses—					
Salaries	£498	14	3		
Repairs of mains and services	437	3	8½		
General expenses	44	8	1		
				980	6 0½
Management expenses—					
Salaries	£176	2	7		
Stationery, printing, and offices expenses	135	6	3		
Rent, rates, and taxes	377	1	6		
Auditing	26	5	0		
Law charges	90	7	2		
Bank charges	42	0	4		
				847	2 10
Balance				4,670	1 6
				£13,617	9 9

Receipts.

Gas			£10,857	13 7
Meter-rents			111	2 3
Residual products—				
Tar and ammoniacal liquor	£1639	13 2		
Coke	896	18 8		
			2,536	11 10
Fittings profits			92	2 1
			£13,617	9 9

KEIGHLEY LOCAL BOARD GAS SUPPLY.

At the Monthly Meeting of the above-named Board last Tuesday, the report of the Gas Manager (Mr. John Laycock) was read, as follows:—

	Cub. ft.
Gas made during the month of August, 1880	4,204,000
Gas made during the corresponding month last year	4,387,000
Decrease	183,000
Gas made from Jan., 1880, to Aug. 31, 1880	58,804,000
" " Jan., 1879, to Aug. 31, 1879	54,919,000
Increase	3,885,000

The average illuminating power of the gas supplied during the month was stated to be equal to that of 15·3 sperm candles.

The Gas Committee laid before the Board the statement of accounts for the year ending June 30. This showed that the net proceeds amounted to £6736 17s. 1d. Of this sum the Committee recommended that £1403 3s. should be placed to the credit of the sinking-fund account, that £3760 should go to the credit of the suspense account for water-works purposes, and the balance of £1573 14s. 1d. should be placed to the credit of the reserve-fund account.

These recommendations were adopted.

The Committee further recommended that the price charged for gas should be reduced to 2s. 11d. per 1000 cubic feet to ordinary consumers within the rating district of the Board, and to 3s. to those outside the district. That the following discounts should be allowed to consumers who paid their accounts within 14 days after delivery:—Under £50, 5 per cent.; above £50 and under £150, 7½ per cent.; and above £150, 10 per cent. Also that the price of lighting, cleaning, and repairing the public lamps within the Board's district, and for gas for the same, should be reduced to £2 2s. net per lamp per annum, and that the price of gas supplied to all public lamps outside the district should be reduced to 2s. 8d. net per 1000 feet.

Mr. MANN moved, and Mr. SELLERS seconded, that the reduction should date from the 1st of July last.

An amendment was proposed by Mr. GLEDHILL, and seconded by Mr. NEWTON, to the effect that the reduction should not begin until the 1st of January next.

The amendment was, however, lost by a majority of one, and the minutes of the Committee received the sanction of the Board.

The following are some of the working details of the accounts for the past twelve months:—

Cost of coal and cannel, per 1000 feet of gas made			1s. 2·9d.
Deduct receipts from residuals,	"	"	1 0·9
Net cost of coal,	"	"	0 2·0
Net working expenses,	"	"	0 10·5
Expenditure for gas,	"	"	1 0·5
Interest account,	"	"	0 6·3
Total cost of gas,	"	"	1 6·8
Net profit on gas,	"	"	1 5·5
Received for gas,	"	"	3 0·3

Capital expended	£87,126 17 7½
Ditto per 1000 feet of gas sold	17s. 10·8d.
Coal and cannel used (proportion of cannel 0·7 per cent.)	10,365 tons.
Gas made = 103,843,000 cubic feet = 10,019 cubic feet per ton of coal used.	
Gas sold = 97,335,974 cubic feet.	
Gas used on works. 471,600 "	
Total accounted for 97,807,574 cubic feet = 9436 cubic feet per ton of coal used.	
Unaccounted for 6,040,426 " = 583 " "	
or a loss of 5·81 per cent.	
Average quality of gas supplied 16 sperm candles. Parliamentary standard, 14 sperm candles.	
Coke sold 5337 tons = 10 cwt. 1 qr. 5 lbs. per ton of coal used.	
Tar sold 716 tons = 1 cwt. 1 qr. 15 lbs. " "	
Ammoniacal liquor sold 1333 tons = 2 cwt. 2 qr. 8 lbs. " "	
Cost of coal and cannel, 11s. 7·6d. per ton.	

SOME NOTES FROM AMERICA.

(FROM OUR OWN CORRESPONDENT.)

In the suit between the two Gas Companies at Yonkers, to which I referred in my last letter (*ante*, p. 346), the jury returned a verdict for the defendants. The facts of the case, which were developed in the trial, were about as follows:—In 1878, when the two Companies, the Yonkers and the Westchester, ceased their rivalry and portioned the city into two districts, the former Company, which is the older, manufactured all the gas and supplied the Westchester Company in bulk; but when a third Company was started the two older ones looked round for a cheap process of making gas, and adopted a water gas, made by a process of their own invention. The Westchester Company were not satisfied with this gas; hence the discontinuance of the agreement. Then the Westchester Company sued the Yonkers, claiming that they had been charged with more gas than they had received. They failed to make out their case, the verdict being given for the defendants. The plaintiffs first appealed from the verdict; but later it was agreed the whole matter should be submitted to arbitration, one arbitrator to be chosen by each Company, and these two to select a third. Thus the affair rests for the present.

The *American Gaslight Journal* for the 2nd inst. contains a lengthy account of the endeavour of the Municipal Gas Company of Charleston (S.C.) to start competitive works in that city. The new Company asked for permission to open the streets for the purpose of laying their mains. After hearing all parties interested, the Council refused the request. The matter will not, however, be allowed to rest here, as the petitioners will use every means to secure their object.

At the meeting of the American Science Association, held in Boston in the latter part of August, Professor Love, the Gas Examiner for New York City, read a paper on "The Illuminating Gas of New York City." In the course of his paper the Professor spoke of the different processes by which gas is manufactured in that place. He noticed a change the Mutual Company had made in their process of manufacture, which is of considerable interest. In my first letter (see Vol. XXXV., p. 801), I spoke of this Company's gas being manufactured from naphtha and coal; later on they added wood to the list of their raw materials. Now the wood gas is double in quantity that made from coal, and shortly the latter material will be dispensed with altogether. According to the figures given by the Professor, it appears that the Company pay 5 dols. 22c. (£1 0s. 11d.) per cord, and obtain 47,000 feet. About 80 lbs. of wood are carbonized per charge. The illuminating power of the commercial gas—that is, the mixture of coal, wood, and naphtha gas—averaged for the first six months of this year 26·53 candles, of which the specific gravity is from ·703 to ·808. For 1879, wood gas was first manufactured in September of that year, the sulphur average was 7·28 grains, and the ammonia 0·82 grain per 100 cubic feet. The percentage of carbonic oxide in the gas is 27·19, which exceeds the proportion in the Municipal gas by about 7 per cent. At the same meeting at which Professor Love's paper was read, Mr. Elliot, of Washington, presented a communication on "Electric Lighting as applied to Large Areas." This gentleman called attention to the vast amount of energy which is stored up beneath the earth's surface, and the problem of economically developing this energy. The two processes by which coal can be converted into light are by the manufacture of ordinary coal gas and by electricity. Mr. Elliot claimed that, in the case of large areas, electricity is more economical than gas. Electric lighting he divided into three kinds—the first, by the voltaic arc; the second, by incandescence; and the third, a modification of these two, known as the electric candle. The first he claimed to be the most economical, while the mode by incandescence is more adapted, as far as the electric light is adaptable, to illuminating smaller areas, such as for domestic purposes. He gives the candle power developed by the voltaic arc as ranging from 1200 to 2500 per horse power, while the figure by the incandescent mode is placed at about 170 candles.

In my last letter I alluded to an experiment about to be made at Holyoke (Mass.), where by means of a 300,000-candle power electric light placed on a tower 175 feet high, it is proposed to illuminate a section of the city both indoors and out. I do not think this test will be carried out, as a similar one made at Nantasket Beach, near Boston (Mass.), has not resulted very satisfactorily. In this experiment, the Northern Electric

Light Company, which made the test, erected three wooden towers, 100 feet high; on each were placed 12 electric lights of the Weston patent, each rated at 2500 candles. The towers were arranged in the form of an equilateral triangle, the side of which was 500 feet in length; thus concentrating in a small area the light of 90,000 candles. It did not produce daylight by any means, but only light enough for a couple of base-ball nines to play a very indifferent match. The motive power employed was, according to the Company's figures, 36-horse power. Though the rays of light were discernible a mile distant, it had but little power beyond a radius of an eighth of a mile from the towers. The object of the Company was to prove by this experiment that, by concentrated large electric lights, cities, both indoors and out, could be thoroughly illuminated. I do not think they will make many more experiments of this kind.

MANCHESTER INDUSTRIAL EXHIBITION COMPETITION OF GAS STOVES.

(FROM OUR OWN CORRESPONDENT.)

I have already referred to the collection of gas-cooking apparatus at the Industrial Exhibition now being held at the Pomona Gardens, Manchester. Silver medals, as has been stated, are being offered by the Gas Committee of the Manchester Corporation for excellence in gas apparatus, and a special feature of the exhibition during the past week has been a competition of gas-cooking stoves which took place on Wednesday last. All the recent improvements which have been made in gas-stoves were fully represented, and the result of the competition was thoroughly satisfactory so far as it may be regarded as a demonstration not only of the economy and cleanliness of gas stoves, but of their thorough adaptability to all the purposes of cooking. The stoves competing included those worked by internal and external heat, and a couple of coal stoves also entered into the competition. To the large, or what are known in the trade as the six guinea stoves, a 10-lb. leg of mutton, 5 lbs. of potatoes, and two cauliflowers were supplied, and to the small or two guinea stoves a meat pie. Meters were attached to each stove, the time of lighting, the period elapsing before they were heated for the reception of the food, and the time occupied in cooking were duly noted, whilst the quality of the cooking was subsequently put to a practical test by a dinner to which about 150 children from the Manchester Refuge Schools and the Judges afterwards sat down. The Judges were Messrs. T. Newbigging, C.E.; H. Lyon, late of the Rochdale Road Gas-Works; and E. T. Bellhouse, C.E.; and the competitors were—Six guinea stoves: Messrs. Greene and Son; Beverley and Wylde; Stark and Co.; Davis and Co.; Elliott, Alston, and Olney, representing Messrs. Wright and Co.; Billing and Co.; Galli and Co.; and Leoni and Co. Two guinea stoves: Messrs. Greene and Son; Sanitary and Domestic Appliance Company; Messrs. Elliott, Alston, and Olney, representing Messrs. Davis and Co.; Wright and Co.; and Billing and Co.

Of course until the Judges have made their awards, it would be out of place to enter into any comments with regard to the merits of the respective stoves, but it may be mentioned that most of them were ready for receiving the food to be cooked in three to five minutes after being lighted, the longest time required in heating being in the stoves worked by external heat. The average time occupied in cooking was about one hour and three quarters with internal heat, and over two hours with external heat. So far as the cooking was concerned, of course the stoves were not tested to anything like their full capacity; but the result was generally highly commended, and in the small stoves the pies were well browned, showing that a good top heat, which has sometimes been considered a weak point in gas stoves, was secured. The coal stoves took a much longer period to heat than the gas stoves, but the actual cooking, when they became properly heated, was accomplished in less time. It is expected that the Judges awards in this and other sections of the exhibition will be announced on the 29th inst., and I may then refer to a few other gas exhibits which have not yet been noticed.

M. CADEL'S PAPER ON HOT CONDENSATION.

In the *Journal des Usines à Gaz* for the present month there is an important and somewhat lengthy "Note" on M. Cadel's paper on Hot Condensation, a translation of which appeared in the last number of the JOURNAL. The author is M. Foiret, Engineer of the Arts and Manufactures, and he brings to the criticism of the paper, and the treatment of the subject generally, a considerable amount of knowledge as to the history and present position of this question.

M. Foiret commences by remarking that M. Cadel's paper has obtained a very brilliant and perfectly legitimate success in the gas world, and that the results therein recorded justify the hope that its author has found a practical solution of one of the most difficult problems connected with gas manufacture—viz., increased illuminating power. The work he (M. Foiret) is about to discuss raises, he says, some very complex questions, and the propriety of adopting the processes in use at the works at St. Etienne, of which M. Cadel has the superintendence, merits profound study and the most exhaustive discussion. The system of hot condensation, which has been known for so many years, remained, for Frenchmen at any rate, for a long time in the realms of theory, and even in England, its birthplace, it made but little progress, notwithstanding the favourable results obtained from its employment in certain isolated trials.

The author then proceeds to give a sketch of the principles upon which the system is based, and expresses his intention of relying only upon trials conducted with the greatest care, and upon figures arrived at as the result of experiments made by gas engineers and other competent persons who have been engaged in the study of this question. In this historical sketch M. Foiret first of all refers to the fact of the attention of the gas world being called to the inconveniences attending the condensation of gas by cooling, by the publication, in 1867, of the Rev. W. R. Bowditch's well-known work, in which, according to M. Foiret, the true principles of condensation were for the first time laid down. He then quotes a long extract from the first chapter of the work referred to, with the object of showing that to Mr. Bowditch is due the honour of the discovery of the system of condensing tar by heat. These principles, which were at once so rational and so clearly expressed by Mr. Bowditch, did not attract much attention, and although certain experiments were tried in England and in America, with the aid of appliances specially constructed for the purpose, hot condensation was not generally adopted. For the popularizing of the method the gas world are in the main indebted M. Foiret thinks, to Mr. R. H. Patterson, who, in a series of excellent articles published in the JOURNAL OF GAS LIGHTING (see Vol. XXXIV.), very fully discussed this subject. The new system did not, however, altogether escape the notice of French gas engineers, and probably their consideration of the subject led to the employment of large collecting-pipes, placed within and sometimes even outside the retort-houses. The advantages of increased illuminating power and diminution of naphthaline deposits which those gentlemen often observed, were attributed to the slow and gradual condensation of the tar, which really does not explain anything, and, on the other hand, no importance was attached to the temperature of these pipes, which were fixed indifferently upon the interior or the exterior walls of the retort-houses, thus showing that such arrangements were only an insufficient, not to say irrational following of the system indicated by Mr. Bowditch. The difficulty is now, however, completely solved, and it is an undoubted fact that the results obtained by means of the collecting-pipes are attributable (1) to the more rapid arrest of the heavy tars, due to the reduction of the rate of flow of the gas in the pipes; and (2) to the higher temperature of the gas in the condensers, which allows more of the hydrocarbon vapours to be retained therein. The process comprises two distinct parts—(*a*) the physical or mechanical, consisting of the adoption of fresh arrangements for the separation or precipitation of the tar; and (*b*) the chemical, the consequence of the former, which demonstrates the advantages to be derived from it, as far as the quality of the gas—or, employing the phrase more generally used, its illuminating power—is concerned.

M. Foiret then remarks that, from Clegg's time down to the present, all the condensing arrangements in use have been constructed on the principle of offering the greatest amount of surface to the operation of atmospheric air or water; but all have, in his opinion, been based upon a false analogy with appliances for the condensation of vapours, and thus their employment leads to very serious results as far as regards the illuminating power of the gas. One proof of their inefficiency is to be found in the difficulty experienced in some works in effecting the complete elimination of the tar, notwithstanding the extent of the cooling surface employed. This tar, carried forward by the rapidity of the current of gas, does not exist in it in the state of vapour; it is liquid, and takes the form of globules suspended in the gaseous current, and therefore it is evident that the physical laws of condensation are not applicable to it in a general way. This opinion is supported by Mr. R. H. Patterson, whom M. Foiret quotes at some length. The condensation of tar, or rather its precipitation, may therefore be effected by rest. This has been proved by experience. All that is required is to allow the gas, on leaving the hydraulic main, to flow into a large receiver—a gasholder, for example—where it will be almost motionless, so that the tar held in suspension may be condensed. This process was carried out many years ago by Mr. G. Livesey, who has on several occasions testified to its advantages, and it has quite recently been re-introduced at the South Metropolitan Gas-Works by Mr. John Somerville, who communicated an interesting paper on the subject to the British Association of Gas Managers, at their meeting in June last. (See JOURNAL, Vol. XXXV., p. 1052.)

Following in the same line of thought, a trial of the precipitation of tar by rest has been made in Germany by M. Grahn, and the results reported by Dr. Schilling in his "*Traité d'Eclairage.*" M. Grahn wished to ascertain what was the influence of temperature upon the condensation of the tar, and for this purpose he passed some crude gas, at 60·5° C. into a holder, and noted the following results:—In falling from 60·5° C. to 58° C. it deposited 238 cubic centimètres (14·5 cubic inches) of tar; from 55·5° C. to 9·5° C., no tar whatever, only ammoniacal liquor; consequently all the tar was condensed during the short interval of time occupied by the gas in cooling 2° C. Dr. Schilling adds: "This trial furnishes the surprising result that at 58° C. all the tarry particles were liberated, and that consequently below 58° tar was no longer deposited, but only ammoniacal liquor. This fact appears astonishing in this sense, that we know that gas cooled in the scrubbers down to 10° C. still deposits tar, some of which even finds its way into the purifying material." M. Foiret thinks, however, that the results, interesting as they are in many respects, show nothing surprising, but, on the contrary, are easily explicable. By means of the condition of rest upon which the gas is allowed to enter in a holder, the globules of heavy tar, under the action of specific gravity, are easily precipitated, and this takes place with greater facility the more perfect the state of rest. It is quite evident that temperature does not take any part in this purely mechanical operation, for if the act of cooling had any appreciable influence, there would necessarily be found, in the case cited by Dr. Schilling, some tar condensed during the period when the temperature dropped from 55·5° C. to 9·5° C. If the ordinary coolers do not sufficiently arrest the tar, it is because the velocity of the gaseous current in them is too great, and because the tarry particles in suspension in it are carried forward, and cannot afterwards be arrested except by mechanical action, such as impingement, or shock. Then we find that M. Cadel condensed, at the temperature of 80° C., one-third of his total production of tar, by means of a simple pipe 5 ft. 9 in. in diameter, placed upon a setting of double retorts 7 in a bed.

All these facts practically confirm the opinion entertained by Mr. Bowditch as to the various systems of condensation employed up to his time, and they warrant the conclusion that the placing of a receiving vessel of large dimensions after the hydraulic laid upon the setting of retorts, is the most rational and the most efficacious arrangement for the condensation of the heavy tars. The small quantity of light tar that will remain in the gas may be easily checked afterwards, either by appliances constructed to arrest it by impingement, or by means of washer-scrubbers. Data are still wanting for fixing with accuracy the dimensions of this vessel; experience alone can settle the matter. It is, however, quite certain that by laying the artificial hydraulic upon the setting of retorts, and by placing at its outlet an apparatus in which condensation would be effected by impingement, the whole of the tar produced in the retort-house would be arrested. The gas would become cool farther on, in the pipes conducting it to the washers, as well as in these vessels themselves. This is the most rational arrangement, and it is M. Foiret's firm conviction that it will be generally adopted in the future. M. Cadel, he says, advises, for double settings of 7 retorts, an artificial hydraulic 2 mètres (6 ft. 6 in.) in diameter; but M. Monnier, who was one of the first to adopt Mr. Bowditch's ideas, recommends, upon his own personal observation, a capacity of 3·5 cubic mètres (123·5 cubic feet) for every 1000 cubic mètres of gas made, which would represent somewhat lower dimensions. He adds, however, that advantage would be gained by prolonging the time of condensation at a high temperature, which is *à priori* evident. Consequently, the following dimensions for the artificial hydraulic may be considered as sufficiently justified:—1·57 square mètres (16·9 square feet) for single settings of 7 retorts, and 3·14 square mètres (33·8 square feet) for double settings. In the case of small works, the necessary allowance could easily be made in the size, by reducing it in proportion to the make of gas per 24 hours. With regard to shape, M. Foiret agrees with M. Cadel that the flat-bottomed pipe is by far the most preferable, whether as regards its allowing the minimum of contact with the tar, or obtaining a suitable temperature of the artificial hydraulic, which in this way will be in direct contact, over a considerable surface, with the arch of the retort-benches.

In the preceding paragraphs M. Foiret deals with the mechanical portion of the process. He then considers the advantages to be gained by hot condensation, having regard to the illuminating power of the gas made; and in doing so again gives the credit of the discovery of the process to Mr. Bowditch. After quoting M. Cadel's very clear *résumé* of his system, he says that all that gentleman's efforts were directed towards one point, which was the real difficulty in the case—viz., to separate as quickly as possible the heavy tars from the gas, and to effect this separation at the highest temperature possible and with the minimum of contact. Here lies the originality of the process adopted at the works at St. Etienne, and it is this that distinguishes it entirely from the systems invented by the English engineers. The injurious influence of tar, and

especially of the heavy oils, is well known, and in proof thereof M. Foiret quotes an experiment tried by Mr. Bowditch, who passed some 13-candle gas over heavy oil at the ordinary temperature, and upon its issuing from the apparatus it had the illuminating power of 1 candle only. He also quotes from Mr. Young's paper presented to the West of Scotland Association of Gas Managers in June, 1875 (see JOURNAL, Vol. XXV., p. 803), in confirmation of Mr. Bowditch's experience, and states that a great number of experimenters, among them M. Cadel himself, have arrived at similar results, which all point to the importance attaching to the rapid separation of the heavy tars from the gas, at a suitable temperature. Ordinary tar, being composed of heavy and light oils, has not anything like the same deleterious influence upon the illuminating power of the gas as the heavy tars. It contains in itself a large proportion of the light-giving elements, and consequently has no tendency to absorb them from the gas. Some experiments made by Mr. Greville Williams have shown that 16·24-candle gas, in passing through a column of coke impregnated with tar, lost 1·85 candles, or about 10 per cent. of its illuminating power. (See JOURNAL, Vol. XXXV., p. 949.) This was the figure indicated by M. Cadel, and it is certain that the richer the tar is in light oils, the less detrimental will be its influence upon the illuminating properties of the gas. M. Foiret demonstrates this proposition at considerable length, quoting, in support of his arguments, Hofmann, Bunsen, Letheby, "King's Treatise on Coal Gas," Dr. Knublauch, and Mr. R. H. Patterson, who refers to the results obtained at the Gibraltar Gas-Works, where the employment of hot condensation enabled the Manager to dispense with the use of cannel, while the illuminating power of the gas was increased on an average by 2 candles, or about 12 per cent. All the other trials made in the same direction have been attended with similar satisfactory results.

M. Foiret next devotes a portion of his "Note" to replying to some of the questions of detail raised by M. Cadel in his paper. It appears, he says, to be feared lest the benzine retained in the gas should be deposited either in the mains on the works or those laid in the streets. This fear is, he thinks, quite illusory. Ordinary lighting gas is, on the contrary, susceptible of containing large quantities of benzine without reaching its point of saturation, and this he shows by a quotation from Regnault. If a small quantity of the light oils is met with in the syphons, it is owing to a mechanical action which is of no real importance. One cause is the condensation of the aqueous vapour, which carries forward the hydrocarbons, particularly naphthaline.

With regard to the action of mechanical condensers, which M. Foiret considers to be the rational complement of the new system, M. Cadel found that his apparatus, when placed after the artificial hydraulic, caused a decrease in the illuminating power of the gas. Is this injurious influence sufficient to forbid its employment? asks M. Foiret. He thinks not. Admitting that only the heavy tar, which has a particular avidity for the light-giving hydrocarbons, can be condensed in the artificial hydraulic, we should, he says, be obliged later on to condense the light tar. With this object, let there be employed collecting-pipes, a pipe condenser, or water coolers, and even then there will be a certain distance traversed by the gas, in the course of which it will be in contact with the tar. In traversing this distance the illuminating power will be attacked—lightly, it is true, but still it will be attacked; and it is evident that the apparatus for condensing gas by impingement will offer the minimum of contact with the tar in order to effect its complete precipitation. For this and other reasons this special form of condenser should be preferred to all other appliances for effecting condensation by heat.

With reference to the production of naphthaline, it is now generally admitted, M. Foiret says, that it takes place more especially in the last hours of the distillation. Naphthaline thus produced dissolves in heavy oil with more facility the higher the temperature is. In order to extract the greater part of it, all that is required is to bring it into contact with the heavy tars at the temperature of the artificial hydraulic. By distributing the charges of the retorts in such a way that the gas rich in naphthaline produced in the last hour of the distillation shall mix, in the artificial hydraulic, with the gas produced in the earlier hours of the charge in the neighbouring bench, we shall succeed, by this intimate and prolonged contact, in dissolving and condensing the naphthaline vapours by the action of the heavy oils. The results communicated by M. Cadel demonstrate the correctness of this theory, and it is one of the most interesting points in the remarkable experiments conducted at the works at St. Etienne. We may, then, conclude with M. Cadel, that hot condensation allows us to increase at will the illuminating power of the gas and to suppress deposits of naphthaline. These two results alone will, M. Foiret thinks, be sufficient to ensure the success of the system; but its adoption will, besides, lead to certain practical results, to which he invites the attention of all gas managers. In the first place, in the case of those engaged in foreign works, they will be enabled to relieve themselves of the import duties they now pay on foreign coals, as Boghead and cannel will no longer be required to bring up their gas to its normal illuminating standard, as it is quite possible and more economical to do this by means of the light hydrocarbons of the tar condensed hot. This tar may perhaps be slightly depreciated in value commercially; but for nine-tenths of the gas-works this will be quite a secondary consideration. Moreover, a few grains less of benzine or light oil in the tar per cubic mètre of gas produced will not sensibly alter its value. Secondly, distillation of the coal may be carried to its utmost limit, and consequently the greatest possible quantity of gas be obtained from the raw material, without any fear being entertained as to the gas not being of the standard illuminating power. Lastly, the distinctions which have existed up to now with respect to the qualities of coal for gas-making purposes will henceforth be disregarded, as every gas-producing coal will be capable of furnishing gas of the standard quality, as it will be simply a question of the arrangement of condensers.

M. Foiret concludes by stating that since M. Cadel made public the results of his experiments, several large gas companies have taken up this matter in earnest by having appliances fitted up for testing the value of the system in actual work, and he is of opinion that by next spring the gas world will be in possession of some comparative results which will enable them to bring to the consideration of this important question, a definitive judgment, the nature of which, he thinks, it is not difficult to foresee.

UNPROFITABLE GAS-WORKS IN WALES.—At a meeting of the Merthyr Union Assessment Committee, held on Saturday, the 18th inst.—Mr. R. H. Rhys in the chair—Mr. Lewis appealed against the rating of the Hengoed Gas Company (which was assessed at £62 gross and £50 rateable value), on the ground that the works were not a paying concern, but an actual loss to the Company last year of £20 15s. 7d. After some discussion it was ultimately agreed to reduce the assessment to £40 gross and £30 rateable. Mr. T. Thomas supported an appeal on behalf of the Quakers Yard Gas Company, whose works were rated at £125 gross and £100 rateable. The plea of this Company also was that the works were unprofitable, a loss of £35 16s. 7d. having been sustained upon the last year's working. It was resolved in this case to reduce the assessment to £100 gross and £80 net.

LEICESTER CORPORATION WATER SUPPLY.

In the last number of the JOURNAL (p. 451), reference was briefly made to the opening of a new filter-bed in connection with the Leicester Corporation Water-Works. In the course of the proceedings connected with the ceremony of turning on the water—at which many members of the Town Council, and others associated with the works, were present—some particulars were given of the nature of the water undertaking of the Corporation, and these may not be altogether devoid of interest.

It appears that owing to the increased demand made upon the Corporation for water, two new filter-beds have for some time been in course of construction at Cropstone, and it was one of these which was recently opened. The workmanship of the filter is of a solid and substantial character, and there are evidences of a considerable amount of engineering ability having been brought to bear on its construction. The second filter will be equally well formed. Both filters are of stone, from the Duke's Quarry, Whatstandwell, Derbyshire, the materials used for filtering purposes consisting of stone from Swithland, upon which is placed sand, from the bed of the Trent, after undergoing a washing process. Mr. T. Hawksley, C.E., the Engineer to the Water-Works Company previous to the transfer of the undertaking to the Corporation, in 1878, has acted as Consulting Engineer to the latter body during the formation of the new filters, Mr. F. Griffith having discharged the duties of Resident Engineer and Manager.

The company having assembled, Alderman BARFOOT, the Chairman of the Water-Works Committee, remarked that before he performed the ceremony of turning on the water into the filter ready for use, he wished to say a few words as to the capacity of the filter-beds. The four old filter-beds they saw in close proximity to the two new ones had a capacity of 4240 square feet, and it was estimated that they would, when in good working order, filter 2 million gallons of water per day. But the Corporation wanted the filters to do more than this, as some times they were out of order, and could not be kept at work altogether. They wanted, in consequence of the increased quantity of water consumed in Leicester and the adjacent villages, a greater area for the filtration of the water sent from the works at Bradgate, and consequently they had laid out two beds which had been constructed under the superintendence of Mr. T. Hawksley. The new filter-beds would have slightly over two-thirds the capacity of the four previously in use, and they were estimated to filter 1,477,800 gallons of water per day, which made the filtration capacity of the Cropstone works 3,459,800 gallons per day. The consumption at Leicester was nearly 3 million gallons per day, but it was necessary that they should have plenty of extra filtering power, so as to make the water pure when some of the beds were being cleansed. In the winter time they wanted more water sent into Leicester, owing to the waste that took place, and this was the reason they needed more filtering power at these works. The new filters would cost something like £10,000; and the work had been placed in the hands of gentlemen who had so far carried it out in a manner reflecting great credit upon them. [He then turned the tap, and the water from the reservoir at once commenced to flow over the sand in the filter.] The water would, he said, percolate through 2 ft. 6 in. of washed sand, and would then pass through small and next larger stones before reaching the pure water tank, from which it would be pumped by the engines and carried by pipes to the reservoirs at Gilroes and New Parks, and thence, after being elevated by syphons, would be conveyed on to Leicester.

After the ceremony of turning on the water had been performed, the party inspected the second bed in course of construction, and Mr. C. HAWKSLEY explained the process through which the sand had to pass before being laid in the filter-beds. He pointed out that it had to be washed for two hours, and some men performing this work showed the immense amount of filth extracted from the material by the adoption of this course. Every three weeks the surface of sand in a filter-bed, to a depth of about an inch, required washing, and for this purpose an apparatus had been fixed in the new beds, which would obviate the necessity of carting the material to a tank in another part of the grounds. At Bradgate the filter-beds had not been thoroughly cleansed since they were laid down. Cleansing had now become necessary, and it would be done as soon as possible. Only one bed at a time could be emptied, however, for the daily consumption of water in Leicester was 23½ gallons per head of the population. This was drawn from both reservoirs, the total quantity taken during the past half year having been 510 million gallons.

The company afterwards partook of luncheon—Alderman BARFOOT presiding.

The usual loyal toasts having been duly honoured,

Mr. W. H. ELLIS proposed "Continued Success to the Leicester Water-Works Undertaking," coupling with the toast the names of the Chairman and the ex-Chairman of the Leicester Water Committee.

The CHAIRMAN, in responding, said the Leicester Water-Works were established about 30 years ago, when the borough was only supplied with well water, in a more or less impure state. The death-rate of the town was then very high from all those diseases which were caused by drinking impure water. At the time of the establishment of the works, Leicester had a population of about 60,000; now it contained something like 130,000 souls. The Engineer of the first works projected was Mr. T. Hawksley. The works, though ample for the town at that time, sent to Leicester 1,600,000 gallons of water per day, but they were now sending about 3 million gallons daily. They all remembered the wonderfully dry season of 1866, when the rainfall, which was usually in that district 27 inches per annum, fell to about 17 inches. Just then Leicester was verging upon a water famine, many of the wells having been closed; but the Water-Works Company determined to push forward, and those works were projected and proceeded with, after which an abundant supply was secured. They were very much indebted to the gentlemen who established those works, but he remembered that opposition was taken in every ward in the town against the Corporation having anything to do with the works. The Corporation found it necessary, however, to assist the Company by taking a certain number of shares, and they turned out to be a good investment, but now the Council had the whole works in their own hands, and he ventured to think that the management had not in any way deteriorated. He remembered reading in one of the local papers, when they were trying to take over the works, some remarks to the effect that it would be an injudicious course to pursue, inasmuch as the Company sent to Leicester 40 gallons of water per head per day; but the consumption had been reduced to 23 gallons per head per day, and when they reflected that the Midland Railway Company took from 2 to 3 gallons per day per head of the population for their own consumption, he thought it would show that the consumption was small in Leicester, as compared with other towns in the kingdom where the water-works were in the hands of corporations. They had the Thornton reservoir, which was something like 88 acres in extent, and the magnificent reservoir at Bradgate was 130 acres in extent, so that the two would be sufficient to supply the town of Leicester for some time to come. The revenue of the undertaking was steadily but surely increasing. For the half year ending June, 1879, the receipts were £13,685, and for the next six months £14,322. For the half year ending June 30 last he believed the receipts had been £14,894. The demand for

water was increasing very rapidly indeed, owing to the large increase in the populations of neighbouring villages which required to be supplied with water by the Corporation. He hoped they would be able to supply this demand, and that it would prove to be an advantage to the borough to do so. As regarded the profits from the works since they came into their possession, the first balance-sheet showed that they could pay £4 10s. per cent. on the capital expended; and he believed the second would, when prepared, show that they could pay 5 per cent., so that they would have a handsome balance to place to the account of the borough fund. He did not look upon the purchase of the works from a monetary, but from a sanitary point of view. They were told by their Medical Officer of Health, Dr. Johnstone, that the more the people used the water-works water, and abolished the wells, the more the town had improved in health, and as a result the cases of death from fever had diminished one-half during the last five years. He hoped the works would be as successful in the future as they had been prosperous in the past.

Alderman PAGET also responded, and spoke in eulogistic terms of the Consulting Engineer of the Corporation.

Mr. C. HAWKSLEY, in reply, apologized for his father's absence. Both his father and himself, he said, took a great interest in the water supply of Leicester, and it was something to be satisfied with when they knew that since the works had been established the town had never been without a constant supply. The original capital of the Water Company was £80,000, but the Bradgate works cost £120,000. So desirous, however, were the Company to provide the town with the additional supply needed, and so satisfied were they that the locality would provide that supply, that the first meeting of the Directors, at which it was decided to embark in the undertaking at Bradgate, only lasted 20 minutes. They knew that it was the best that could be done for the town. The Act of Parliament, enabling the Company to establish the works, was obtained in 1866, and in constructing them care had been taken not to deteriorate the beautiful scenery of the district, which everybody desired should not be interfered with, especially in the neighbourhood of a town like Leicester. Directions were given that the works should be made to harmonize as much as possible with the surroundings. The grounds were tastefully laid out, and the buildings erected in the Tudor style of architecture, in which style old Bradgate House was built. It was satisfactory to know that the Corporation had determined to maintain the place as it was. They had found it necessary, as the late Company would have done had it now been in existence, to increase the area of the filter-beds, and they were also looking to the future, bearing in mind that in all probability at no very distant date Leicester would require still further works, and also bearing in mind that it took five or six years to get an Act of Parliament and construct the works authorized by it. All these things were being borne in mind by the Committee having charge of this department. As to the question of waste of water, it was satisfactory to know that it had been reduced; but he thought there was room for further improvement in this respect. It was a mistake to keep taps running to cleanse drains, because a gallon of water sent down with a rush would do more good than a day's dribbling. Besides, by wasting the water they put additional pressure on their sewage works, so that the waste was actually at both ends.

Other toasts followed, and the proceedings terminated.

EDINBURGH AND DISTRICT WATER SUPPLY.

At the Meeting of the Edinburgh and District Water Trust on Tuesday last—Lord Provost BOYD in the chair,

The CLERK read the estimates of the income and expenditure for the year ended Whitsunday last, and the estimated receipts and expenditure of the Trust from May 15, 1880, to May 15, 1881. The income was estimated as follows:—Meter supply, £9592 10s.; shipping, £550; lime, £1500; special and miscellaneous, £7000; arrears of water-rate, £350; rents in town and country, £232; pipe-joinings and miscellaneous receipts, £225—total, £19,449 10s. The following was the estimated expenditure:—Salaries, £2378 15s.; wages, £2974 14s. 4d.; repairs, £2324 19s. 1d.; feu duties, £443 1s. 5d.; rents, £211 6s. 3d.; taxes, £4397; printing, £118 13s. 6d.; stationery, £70; advertising, £75; interest, £26,985; annual surface damage, £19 19s.; annuities, £24,219; miscellaneous expenses, £705 6s. 8d.; law expenses, £389 14s. 6d.; sinking-fund, £5719; expenses of transfer and new loans, £573 10s. 6d.; Act of Parliament, 1880, £531 5s. 10d.—total, £72,136 6s. 1d.; leaving £52,686 16s. 1d. to be raised from the rates. The assessments the Finance Committee recommended were as follows:—Upon houses of £5 rent and under, 4s.; on houses above £5 and not exceeding £10, 9d. in the pound; on houses above £10, 9d. in the pound, payable by occupiers; on shops, 2d. in the pound; public water-rate, 1d. in the pound. This would give a total of £54,218 14s. 1d., which, added to the £19,449 10s. as above, makes a grand total of £73,668 4s. 1d. Deducting from this estimated total 1½ per cent. for irrecoverable arrears, £1092 4s. 1d., leaves a net total of £72,576, to which must be added the surplus over expenditure of previous year, £41 6s. 2½d., making the total estimated receipts £72,617 6s. 2½d.

The estimates were agreed to.

THE WATER SUPPLY OF CUCKFIELD.

A Public Meeting of the Ratepayers of the Cuckfield Local Board District was held on Monday, the 20th inst.—Mr. R. A. BEVAN in the chair—to consider the question of establishing water-works for the district.

The CHAIRMAN opened the proceedings by stating that the meeting had been called in consequence of the present insufficient supply of water in the town, and of the demand for water in the neighbourhood generally.

Mr. T. W. BEST said that the Local Board of Hayward's Heath were desirous of establishing water-works there, and it was thought that the Cuckfield Board would join them in the scheme, and so make it less expensive, as well as for the mutual benefit of both parishes.

Mr. C. O. BLABER gave an estimate of the cost of the scheme. Supposing the scheme were adopted, he said, and the water were obtained, as it was proposed, from Westmeston, the cost of land, wells, service reservoirs, pumps, machinery, &c., in duplicate, would, it was estimated, cost £5150; a 10-inch main from Westmeston to Hayward's Heath, £9800; distributing-main for Hayward's Heath, £1740; ditto, Cuckfield, £1850; parliamentary charges, &c., £1110; and other miscellaneous matters, which would bring the total cost to £20,000. The population of Hayward's Heath was estimated at 2200, and of Cuckfield 1570; the rateable value of each district, according to the last rate, was—Hayward's Heath, £7715; Cuckfield (including the new district), £6600. Assuming that the £20,000 could be borrowed from Government at 3½ per cent., repayable by 40 annual instalments, each instalment would be £936 9s. 2d. To this would have to be added the working expenses, making with the annual instalment a yearly expenditure of £1436 9s. 2d. The water-rents would form a deduction from this sum, and taking them at 1s. 3d. in the pound upon the rental value of the houses in the district, and assuming that only one-third of the houses would take the water, the annual revenue derivable from this source would be about £300. To this would be added extra charges for baths, gardens, stables, inns, hotels, breweries, &c., making perhaps an additional £250. Then £50 might be added for the workhouse; £200 for the county asylum; and £30 for the railway station, making a total of £880, leaving a balance of about £600 to be borne by the ratepayers of the combined districts. Hayward's Heath would have to pay about three-fifths of that sum—namely, about £360—and Cuckfield the remaining £240, representing an additional rate of 1s. 9d. in the pound for Hayward's Heath, and 10d. in the pound for Cuckfield. This, however, would probably decrease, not only by the increase of value arising from additional buildings, but by the increased number of persons who would take the water, so that it was probable that within a few years the water-works, instead of being an expense to the ratepayers, would, in fact, become a source of profit and diminish the local rates, as at Brighton, where they had saved £4000.

Mr. R. COATER disapproved of the scheme, and said the water supply was quite adequate for the district. He should like to know if they could point to even one of the ratepayers who had complained of a want of water. The greater proportion of the people had a superabundance of water, and there was no necessity for water-works. With regard to the quality of the water he was perfectly satisfied with it, and if the Local Board were going to force this scheme upon the ratepayers it was a perfect mockery to call the meeting.

Dr. BYASS strongly denied the imputation that the Local Board wished to force the scheme upon the inhabitants, and the very fact of the Board having called a meeting in order that the ratepayers might express their opinion ought to satisfy everybody upon that point. The meeting was called to obtain the opinion of the ratepayers generally, and if they decided not to have the water-works, that decision would be upheld by the Board.

Mr. W. COMBER strongly deprecated the proposal, and said he hoped every ratepayer would oppose the scheme.

Dr. BYASS moved, and Mr. BEST seconded, that the meeting be adjourned *sine die*.

Mr. W. COMBER took objection to this. The meeting had been called for a certain purpose, and he thought it no more than right that they should express an opinion now they were there. He therefore moved as an amendment that the meeting do not adjourn.

Mr. F. HOUNSELL seconded the amendment, which, on being put to the meeting, was carried without a dissentient voice.

Mr. COMBER then proposed—"That this meeting does not see any necessity for the proposed scheme for water-works."

Mr. COATES seconded the proposition, which was carried unanimously, and the meeting closed with a vote of thanks to the Chairman for presiding.

SANITARY INSTITUTE OF GREAT BRITAIN.

ANNUAL CONGRESS IN EXETER.

The Fourth Annual Congress of the Sanitary Institute of Great Britain was opened at the Victoria Hall, Exeter, on Tuesday last, under the presidency of Earl FORTESCUE.

Previous to the opening of the Congress, the President and the principal members, including a numerous company, were entertained at luncheon in the Guildhall, by the Mayor (Mr. W. H. Ellis), who presided, and the Reception Committee of the Corporation.

The usual preliminary toasts having been honoured,

The SHERIFF (Mr. S. Jones) proposed "The Houses of Parliament," coupling with the toast the names of Earl Fortescue and Mr. H. S. Northcote, M.P., who each responded.

Other toasts followed, among which was "Welcome to the Meeting of the Sanitary Institute in Exeter," to which Dr. B. W. RICHARDSON, F.R.S., responded; and the proceedings closed with a vote of thanks to the Mayor.

A procession was then formed, and the company proceeded to the opening of the exhibition of sanitary and other appliances, held in connection with the Congress. A tour of the building having been made,

The MAYOR declared it duly opened to the public, and in doing so said he felt sure they would all gain some valuable information from an inspection of the exhibits brought together. It was the first exhibition of the kind ever held in Exeter, and among the best ever held anywhere. They had here brought together plans of drains and taps and ventilators of every kind, and one of the best collections of gas-cooking apparatus ever shown, thanks in a great measure to the liberality of the Exeter Gas Company, who had offered to give medals for the apparatus adjudged to be the best suited for the purposes. There were, he was informed, upwards of one hundred exhibits entered in this department, and he trusted one result of the exhibition would be to encourage a new mode of cooking. Our ordinary fires were very wasteful, and he supposed we used three or four times as much fuel as we ought. As the President had observed to him, the use of gas for cooking would also tend to lessen the black smoke which was so much waste of fuel, seeing it might be converted into gas. The present building he conceived to be suited for such an exhibition, seeing that it was the site of the old gas-works. In conclusion, his Worship expressed a hope that the present meeting of the Congress and this exhibition would result in rendering Exeter and the neighbourhood one of the healthiest places in the world.

On Tuesday evening the first general meeting was held at the Victoria Hall. Dr. B. W. RICHARDSON occupied the chair, but after a few brief remarks vacated it in favour of

Earl FORTESCUE, who proceeded to deliver his Inaugural Address, in the course of which he remarked that his connection with the great sanitary cause dated from the year 1845, when he selected the subject of the health of towns for a lecture to his constituents at Plymouth, and it had remained unabated up to the present time. On looking back at those days, he must allow that, relying on the soundness of their views and the accumulated evidence on which they were based, the early sanitary reformers somewhat underrated the strength of the opposition they had to encounter. Ignorance, prejudice, vain alarm, and real or imagined self-interest, arrayed against them a formidable body, comprising not only the men of the wage class, for whose benefit, as the greatest sufferers from the then general violation of the plainest laws of hygiene, the efforts made for their enforcement were more especially directed, but comprising also too many who ought to have known better. He then gave the history of various sanitary movements with which he had been connected up to the year 1869, when the Royal Sanitary Commission of Inquiry was appointed, and, after taking much evidence, made most valuable reports, upon the practical recommendation in which, and especially upon the most important of them, subsequent sanitary legislation was mainly, though unfortunately not quite without exception, based; that recommendation being that there should be one Local Authority for all public health purposes in every place, so that no local area should be without such an one, or have more than one. In 1871 the Local Government Board, as it stated in its Eighth Annual Report, was established, and the powers and duties of the Poor Law Board under the Poor Law Acts, of the Secretary of State under the Registration Acts, the various Sanitary Acts, and the Local Taxation Return Act, and of the Privy Council under the Prevention of Diseases and the Vaccination Acts, were transferred to the new Board thus created;

while in the following years the powers and duties of the Board of Trade under the Alkali Acts and the Metropolis Water Acts, and the Secretary of State under the Highways and Turnpikes Acts, were in like manner transferred to that department. In 1872 the whole country was, by an Act passed at the instance of the then President of the Board, divided into urban and rural sanitary districts, and each district was placed under the jurisdiction of one sanitary authority, and one only, and provision made for the establishment of a port sanitary authority for every port in England and Wales. In 1875 a measure was passed for consolidating the whole of the sanitary laws into a single statute, thus reducing into a methodical and complete whole provisions which hitherto had been scattered over no less than 22 separate Acts of Parliament. In 1877 were issued complete sets of model bye-laws, relating to almost all the various matters which local authorities are empowered to regulate by bye-laws under the provisions of the sanitary law. Thus it would be seen that during the last seven years a single Central Authority had been established and organized for superintending the administration of the laws relating to the public health, poor relief, local government, and local taxation; secondly, that the entire country had been divided into sanitary districts, and a local authority for sanitary purposes established for every district; so that no area was now without such an authority, or had more than one; thirdly, that the sanitary law had been amended and reduced into methodical form for the guidance of the several sanitary authorities referred to; and, fourthly, that they had been supplied with a code of subsidiary regulations, which, when adopted, would enable them to give full effect to the more general provisions of the law. The value of the service thus rendered to sanitary reform by the consolidation of statutes and unification of authority could only be adequately appreciated by those who had been for years practically engaged in trying to promote and enforce it in a district under some of the 22 sanitary statutes above mentioned, mostly passed in the previous quarter of a century, with some of their clauses still left valid, some half, some wholly repealed or superseded. Coming to the question of the gas and water supply to towns, the President said that as great general principles were involved in the case of the Metropolitan Water Supply, which were also involved, on a smaller scale, in the cases of many much smaller towns in connection with public services of that or analogous kinds—those where the particular service or supply rendered had only a local as distinguished from a general value—he might, perhaps, be allowed to state the views which he had long entertained upon them. In his lecture delivered at Plymouth in 1845, he said: "In cases where, for the supply of a limited because merely local demand, the fixed capital invested bears a very large proportion of what is called reproductive or circulating capital, no effectual competition can take place. Unless the exorbitant charges provoke, or the exorbitant profits tempt, some other party to contend with the original one for the occupation of the whole or a part of a field not large enough for two, the monopoly is complete, limited only by the willingness of the public to consume at the rate charged, and by the dread of the establishment of a rival party. As the probability of this latter occurrence varies, so will the prices; they will fall when the danger is imminent, and be slowly raised as it subsides. If another capital is invested, for a time competition is sharp; but before long the two parties find it their interest to coalesce, and to charge the public, for a supply produced by the application of two fixed capitals where one would have sufficed for the work, as high a price, on the same principle and subject to the same limitations only, as those which affected the returns upon the original capital." Therefore, as he said in his address to the Statistical Section of the British Association in 1877, "The gas and water works of the smallest town or village, with a plant of less than £1000, would have, and ought to be treated as having, a monopoly, because the whole value of the water and the greater part of that of the gas supplied depends upon its position, and the greater part of the cost of supplying it consists in the interest on the capital invested in the fixed and permanent works. The water, which is to be had for nothing but the trouble of dipping for it in the brook below, derives its whole value from the convenience of its position in the water-pipe, which brings it into the house from the reservoir or forcing-pump. The value of the service of a coach or omnibus depends equally upon its localization; it, like a railway, takes people who want to go from some particular place to some other. But then the cost of its service consists chiefly in circulating or easily transferable capital in the shape of the vehicle, horses, and harness, equally available at a slight expense to render similar service elsewhere; whereas the materials of the reservoirs and the pumping-engines and pipes in the case of water-works would only, if transferable elsewhere at all, be so at an expense very heavy in proportion to the concern." He further said, in his lecture in 1845, speaking of the abstract principles on which, in cases where the field was quite open, and the gas or water company had, under legal sanction, occupied the ground: "On the whole, it seems to me that the necessary works for similar purposes are best constructed by individuals or companies—for the action of self-interest will induce them to do it better and more watchfully—with a monopoly granted to them, for a certain time, on certain terms; after which the works themselves should revert to the town, or become purchaseable by the town for a certain amount; that afterwards they should either be managed by the corporation, or, better still, be let by public auction by the corporation to parties, either with certain fixed conditions attached to them at an annual rent to be decided by competition, or else to be let at a fixed rent to whatever party will undertake to guarantee the cheapest and best supply to the town. These systems seem to me to combine to the greatest degree practicable the energy and economy observable in undertakings carried on by interested parties as compared with public bodies, with due security from the unreasonable charges of ruinous and wasteful competition of companies or individuals undertaking for profit works which are too important to the public, and at the same time too much monopolies in their nature to be advantageously entrusted unreservedly and for ever to interested parties." Such were then and at present his abstract opinions upon the question. He said at Plymouth, three years previously, that practically "the sound view with regard to these questions of local public service and supply would seem to be that long ago indicated by Mr. Chadwick—namely, that they should be recognized as in their nature monopolies, but, as such, considered to be the property of the public to be alienated in part for a time, or retained in their own hands, by the State or local authorities, as might seem most for the public advantage." That this view was gaining more and more acceptance was evident from the number of municipalities which had already either set up for themselves or had bought from their original proprietors the water and gas works of their towns, and were carrying them on for the benefit of the inhabitants. Some had already done this for many years; many more were taking steps to do so; and the Metropolitan Board of Works had for some time been wisely contemplating buying up both the water and gas works of the Metropolis, and consolidating under one management what now occupied the staffs of a number of Companies. This general view the late Government seemed to have adopted, and the present one also, to a certain extent, judging by the report carried by the Home Secretary in the recent Select Committee on the London Water Supply; though the two Governments seemed to have differed considerably as to the principles on which the compensation (if any) to the Companies should be based; and as to the composition of the body, or Trust, to whom the making of the arrangement should be confided. On the principles laid down by the first Board of Health, various water and gas works had been purchased by the local authorities of various towns, and usually to the general satisfaction of the inhabitants; the better security thus permanently obtained by the companies for their income helping to render them willing to accept reasonable terms. Passing on to discuss the question of what kind of representative government ought to be given to the inhabitants of London for the management of their local affairs, the President pointed out the necessity of State regulation for capitals as distinguished from mere provincial towns, and proceeded to inquire how, in the organization of our own capital, the vigour belonging to unity of administration might be combined with the constitutional advantages of local self-government. This could be done only on the principle of dividing the several functions or departments among separate and independent bodies, by extending the action of each over the whole area of the Metropolis, instead of combining, as was the usual practice, all those functions under one body, and giving to that body, within a limited area of jurisdiction, supreme authority over all such matters. In each case there would be several governing bodies, but in the one case each body would exercise all municipal functions within a partial area, while in the other case each body would exercise only one class of functions over the whole area. In short, the Legislature should, for the management of the local affairs of the Metropolis, establish, in the shape of separate and independent bodies, that very division of labour which the municipalities of even the smallest boroughs had in the shape of their separate watch, works, &c., committees, everywhere long established for themselves. Having further explained his scheme in detail, and referred to sanitary matters in other parts of the country, his lordship said it seemed clear that sanitary reform, though commended in general terms, had not enjoyed, nor was likely to enjoy, much official sympathy, and though praised in the abstract, was always liable to incur parliamentary and municipal opposition. They must endeavour, now that pretty sound legislation upon it had been obtained, to influence public opinion on behalf not only of its principles but its details. They must enlist general administrative action in conformity with them, and not that alone, but family action and personal action, and that not of the men only, but also, he might almost say mainly, of the women, and especially of the mothers.

On the motion of the Mayor, seconded by the Bishop of Exeter, a hearty vote of thanks was passed to the President for his address, and the day's proceedings closed with a vote of thanks to the Mayor.

The Congress resumed its sittings on the following morning, when Professor De Chaumont, M.D., F.R.S., President of the Sanitary Science and Preventive Medicine Section, delivered an address on the history and progress of sanitary science. This was followed by a paper on "The Unhealthiness of Public Institutions," by Mr. H. C. Burdett, of Greenwich Hospital. Mr. J. Woodman, F.R.C.S., the Medical Officer of Health for Exeter, read a paper on "The Exeter Sanatorium," which was followed by two short papers on "The Influence of Food and Drainage on Disease," and "Forty Cases of Illness following Sanitary Neglect," by Mr. W. E. C. Nourse, F.R.C.S. Dr. W. H. Lake contributed a paper of local interest, entitled "A Century of Death-Rates at Teignmouth," and Mr. H. C. Burdett and Mr. R. B. Grantham read others on "Mortuaries" and "Abattoirs" respectively.

In the evening a *conversazione* was held at the Palace of the Bishop of Exeter, the grounds of which were tastefully illuminated for the occasion.

On the third day of the Congress the Engineering and Sanitary Section opened its proceedings with an address from the President of the Section (Mr. R. Rawlinson, C.B.), entitled, "Old Lessons Reviewed and New Lessons Considered," in which he dealt with sanitary science in the past, the objects to which it might be beneficially applied in the present, and the probabilities of its being more generally taken up by statesmen in the future, to the displacement of that great desire for military glory which now animates the nations of the Old World. The address was followed by a paper by Mr. G. E. Wareing, of Newport, Rhode Island (read by Mr. Rogers Field), on some important sewage works in the United States, especially in reference to the sewage of Memphis. The next paper was by Mr. W. White, F.S.A., "On Water-Closet Construction;" this was followed by one bearing specially upon the locality, and entitled "The Sewage of St. Thomas," which gave rise to a lengthy discussion on the subject of the disposal of sewage. Mr. H. P. Bulnois, C.E., the City Surveyor of Exeter, read a paper on "Sewer Gas Annihilation," and Major-Gen. Scott, C.B., F.R.S., offered some "Suggestions for the Cleansing of Sewers." Captain A. E. Jones, V.C., was the contributor of the last paper, its subject being "The Drainage of Towns," and with the reading and discussion of this the proceedings of the section closed, a vote of thanks having previously been accorded to the President.

In the evening a lecture on "Woman as a Sanitary Reformer" was delivered by Dr. B. W. Richardson, F.R.S., and was listened to throughout with marked attention. At the conclusion a vote of thanks was passed to the lecturer, on the motion of the Bishop of Exeter, seconded by Professor De Chaumont.

The proceedings on Friday commenced with an address on "Meteorology and Geology," by Sir Antonio Brady. Mr. T. Andrew, F.G.S., one of the Vice-Presidents of the Section of Geology and Meteorology then read a paper on "The Geology of Exeter." Mr. F. P. Perkins, Public Analyst for the city, read two others on "The Sanitary Condition of Wells in Exeter and the Neighbourhood," and "Organic Impurity in the Water of the Exe;" Mr. F. C. Stephenson, M.B., contributed a paper on "The Ventilation of Water-Mains;" and the proceedings of the section concluded with the reading of a paper by Professor G. J. Symons, F.R.S., on "Some Deficiencies in our Knowledge of Health Resorts."

In the afternoon the general meeting of the Congress took place under the presidency of Earl Fortescue, and in the evening the members dined together.

On Saturday the President of the Congress entertained the principal members of the Institute, and the working classes were invited to meet at the Victoria Hall, to hear an address by Dr. Bartlett on "The Lessons of the Congress and the Exhibition," and the business of the Congress then closed. The exhibition of sanitary appliances, gas-cooking stoves, &c., will, however, remain open until the 9th of October, the general public of Exeter and the adjoining towns having manifested great interest in the instructive display.

Visit of Royal Engineers to the Reading Gas-Works.—On Friday last a party of Royal Engineer officers from Chatham, under the direction of Captain Clayton, R.E., paid a professional visit to the Reading Gas-Works for the purpose of inspecting them and the new bridge over the Kennet, now in course of construction. Mr. E. Baker, the Engineer to the Company, conducted the party over the works, and explained the process of gas manufacture, &c. Many notes and sketches were made by the Royal Engineers, who expressed themselves highly interested with their visit.

THE TEMPERATURE OF TOWN WATER SUPPLIES.

By Mr. BALDWIN LATHAM, C.E., M. Inst. C.E., F.G.S., &c.

[A Paper read before the Mechanical Science Section of the British Association at Swansea.]

In a paper read last year before this Association,* the Author gave the results of a series of experiments, extending over a considerable period, on the temperature of town water supplies, and referred to the influence of the temperature of town water upon public health.

In the communication referred to, it was shown that the temperature of water, as delivered through the water-mains to the house of the consumer, was totally independent of the temperature of the water at its source, and that the temperature of the water supply was governed, to a great extent, at all periods of the year, by the temperature of the ground, at the depth at which the water-mains were laid. It was further pointed out that the influence of temperature upon water supplies had a very marked effect upon certain classes of disease, especially diarrhœa and cholera, and that it was not until the temperature of the water reached about 62° that these diseases became epidemic in a district.

In order that it may be shown that it is not the effect of increase in atmospheric temperature that is instrumental in propagating diarrhœa and cholera, but that both these diseases are governed by the changes which take place in water when its temperature is increased, it may be pointed out that, in districts in which the source of water supply is not liable to increase of temperature by reason of the arrangements adopted for its distribution, summer diarrhœa does not become epidemic. For example, we will take the three years, 1877, 1878, and 1879. Both the years 1877 and 1879 (especially the latter year) were years in which town water did not reach its most dangerous temperature, but in 1878 the town water supplies arrived at a high and dangerous degree of temperature.

The water distributed under the system of constant supply at the Author's house in Croydon, when drawn direct from the mains, had, in 1878, a maximum of 64·8°; and, in Westminster, the water supplied by the Chelsea Water Company reached a temperature of 68·4°; while water taken from a cistern in Croydon had a maximum temperature, in the same year, of 71·5°. In 1879, the highest temperature of the water in the cistern at Croydon, already referred to, was 67°; the highest temperature of the water, as delivered from the mains in Croydon, in 1877, was 61·7°; and, in 1879, 60·7°; whilst, in Westminster, the highest temperature of the water, in 1879, was 64°. The deaths from diarrhœa in Croydon in the three years, 1877–9, were as follows:—1877, 0·48 per 1000 living in the district; 1878, 1·00 per 1000 living in the district; 1879, 0·34 per 1000 living in the district. In London the deaths from diarrhœa were:—1877, 0·70 per 1000 living in the district; 1878, 1·02 per 1000 living in the district; 1879, 0·52 per 1000 living in the district.

If these death-rates are compared with the death-rates of districts in which the water is principally taken direct from wells, it will be seen that in these latter districts the death-rates are very much lower, as, for example, in the districts of Mitcham and Merton, which are partly supplied with water from artesian wells (of an uniform temperature of about 54·6°), partly by surface wells, and partly by the Lambeth Water Company. These two districts have a population at the present time of about 11,000 persons. In 1877 the death-rate from diarrhœa was 0·39 per 1000; in 1878, 0·47 per 1000; and in 1879, 0·46 per 1000. In Beddington, which is also principally supplied from local wells, in 1877 the death-rate from diarrhœa was 0·20 per 1000; in 1878, 0·49 per 1000; and in 1879 there were no deaths whatever from diarrhœa. In the three years 1877 to 1879, in the districts of Mitcham and Merton, there were 14 deaths from diarrhœa recorded, of which 10 occurred in roads supplied with water by the Lambeth Water Company, and 4 in roads supplied with water from shallow and artesian wells.

In order to further show that the temperature of water has an influence on health, the Author placed upon a map the whole of the deaths from diarrhœa which have occurred in Croydon during the 11 years 1869 to 1879 inclusive. The water supply of Croydon is taken from wells, the range in the temperature of the water of which has not exceeded 1·15°; its highest recently observed temperature being 51·9°, on the 19th of June, 1880, and the lowest temperature, 50·75°, on the 15th of December, 1878. The water, after leaving the wells at Croydon Water-Works, is pumped to a summit reservoir, from which it is distributed to the town. In order to raise the temperature of the water, it is necessary for it to flow a certain distance through the distributing mains before its temperature becomes affected. It is a significant fact that, in the districts within a mile of the reservoir in which the water is always at its coldest temperature in summer, during the whole period of 11 years not a single death from diarrhœa has taken place in the neighbourhood of the leading mains, but the distribution of the deaths occurs in the most remote and lowest portions of the district, or those which are naturally subject to the greatest changes in the range of temperature of the water supply.

The incidence of the deaths from diarrhœa in London and the neighbourhood also shows that this disease is mainly due to the increase in the temperature of water supply, and not to atmospheric temperature, as in all those districts supplied from the River Thames the water naturally gets to its highest temperature at an earlier period than it does in those districts supplied from wells, as in the Kent Water Company's district, where the temperature of the water at its source is pretty uniform throughout the year, and in which the water is naturally colder in summer, at starting through the mains, than is the case with the river water. An examination of the mortality tables of London shows that, while the general mortality from diarrhœa in districts supplied by the Kent Water Company and the river water companies is practically identical, the disease always first manifests itself in the districts taking water from the Thames. For example, in 1878, diarrhœa may be said to have been epidemic in Lambeth (supplied by river water) in the week ending June 29, and got to its highest pitch in the week ending July 27, whereas in Greenwich (supplied with the Kent water) this disease did not become epidemic until the week ending July 17, and got to its highest pitch in the week ending Aug. 3, showing the incidence of this disease to be later in the Kent Water Company's district than in the district supplied from the River Thames, the reason being that, as the water of the Kent Company is colder at its source than the Thames water, naturally it requires the ground to be raised to a higher temperature before the water reaches a dangerous point, and, therefore, the incidence of the disease falls later in the Kent district than in the district supplied from the River Thames. The development of the disease, in these districts, is also conformable to water being the cause, and not general atmospheric increase in temperature, for if the cause were due to atmospheric influences, which are general, the incidence of the disease should have fallen at the same period in each district, but as the incidence is strictly conformable to increase in temperature of the respective water supplies, and does not conform with atmospheric causes, the inference to be drawn is that summer diarrhœa is governed by the influence of the temperature of our water supplies, as invariably the disease becomes epidemic when the water, whatever be its source of supply, reaches a temperature of about 62°.

Having now shown that water may be affected for good or evil by reason of its temperature, and having also shown in a former paper that the earth has enormous powers of influencing the temperature of water supplies, the Author desires to point out a mode by which the temperature of the earth may be made use of, in order to give water a nearly uniform temperature throughout the year, which, if brought into general operation, the Author believes, will remove those dangerous conditions of town water supplies, arising from an increase of temperature in the summer time, and also, possibly, from the extreme coldness of the water in winter periods, which affect public health.

The great changes of temperature in the earth occur within a few feet of the surface. The greatest range of temperature occurs at the surface, and as we pass downwards from the surface to a depth of from 30 to 35 feet, the temperature becomes nearly uniform throughout the year, and at the point of uniform temperature, the temperature is equal to the average yearly temperature at the place the observations are made.

From a number of observations made by the Author, at depths varying from 6 inches to 50 feet, it is shown that, at a depth of 20 feet, the coldest temperature is experienced in the middle of May, and the warmest temperature at this depth at the end of October. The range in temperature observed at this depth is 5° in Croydon. At 25 feet in depth the coldest period occurs at the beginning of July, and the warmest period in the winter, the range in temperature being a little over 1°. At a depth of 30 feet the coldest temperature occurs in July. If an apparatus similar to that which has been invented and patented by Professor J. T. Way and the Author is used for tempering the water, and which consists simply of a vertical tube driven or screwed into the ground to a depth of about 25 feet, the water or other liquid to be tempered being admitted at the top and withdrawn at the bottom of the tube, and special arrangements being adopted for the protection of the ascending pipe, the range of temperature in the water required for dietetic purposes need not exceed 3° throughout the year, when drawn from a 3-inch tube, at a rate not exceeding 1 gallon every half hour. The range of temperature observed in cistern water at Croydon has been 38·7°; or on the 22nd of July, 1878, it was 71·5°; and on the 20th of January, 1880, it was 32·8°. The town water supply of Croydon (drawn direct from the mains), the temperature of which has been shown to be nearly uniform at its source in the wells when distributed by a system of constant service, was shown to be 64·8° on the 22nd of July, 1878, and 37·2° on the 28th of January, 1880, giving a range of 27·6°.

In the tempering tube, when the conditions of water supply are at the worst, the underground temperature is favourable for modifying these dangerous conditions. The cold of winter only descends to the greater depth in the heat of summer, and the warmth of summer only descends to the greater depths in the winter time, so that the temperature of the cold water of winter is raised by the previous summer's heat, whilst the warm water of summer is cooled by the previous winter's cold temperature.

Experiments made at the Author's house in July this year show that if 10 gallons of water are drawn at any time within half an hour, the following results are obtained:—

1st Gallon.—Temperature of water going into tube, 68·4°; temperature of water coming out, 50·4°.				
2nd Gallon.—Temperature reduced from 68·2° to 50·8°.				
3rd	"	"	" 68·2°	" 51·7°.
4th	"	"	" 68·0°	" 52·4°.
5th	"	"	" 68·0°	" 53·3°.
6th	"	"	" 68·0°	" 54·2°.
7th	"	"	" 68·0°	" 55·0°.
8th	"	"	" 68·0°	" 55·8.
9th	"	"	" 68·0°	" 56·4°.
10th	"	"	" 67·9°	" 57·2°.

These experiments have been repeated various times, and give precisely identical results. In the winter the water is raised in temperature, as, for example, on the 3rd of February, 1880, water going into the tube had a temperature of 34·8°, and, coming out, had a temperature of 49·2°.

The advantage of the use of this apparatus consists in the fact that it is entirely self-acting, and the whole of the water supply necessary for dietetic purposes may be filtered, purified, and tempered, without any greater cost than now incurred, after the first cost of the apparatus, and without adding anything of a deleterious character to the water, as may be the case when ice is used, which has been shown, especially in America, to be a prolific cause of disease, when collected from impure sources. Moreover, the results secured by the tube are more than equal to those attained by the most bountiful use of ice, and further, it is doubtful if, by the use of ice in water already subject to influences that are deleterious to health, the time allowed before the water is consumed is sufficient to destroy its noxious properties. In the case of the patent tube, however, a mass of water is gradually undergoing the process of tempering, in a perfectly natural way, until it arrives at a temperature which is shown by experience to be most healthful.

* See JOURNAL, Vol. XXXIV., p. 406.

THE Directors of the Rio de Janeiro Gas Company have decided to pay, on and after the 11th prox., an interim dividend at the rate of 10 per cent. per annum, free of income-tax, for the half year ended the 30th of June last.

BURSTING OF A WATER-MAIN AT ASTON.—About midday on Tuesday last one of the principal water-mains in connection with the Birmingham Corporation Water-Works service burst at Aston. The immediate effect of the accident was a temporary stoppage of the traffic in the locality where the main burst, and some domestic inconvenience caused by a non-supply of water for a few hours. The main ran under the Lichfield Road, and was 24 inches in diameter; and the pressure of water which was rushing through it may be gathered from the fact that the moment the burst took place the earth above was literally forced away, and a ravine 14 yards wide and 2 yards deep was formed for a considerable distance. The water rushed with uncontrolled impetuosity in streams down the road, overflooding the footway and some adjoining fields; and as it swirled round the bridge which spans the River Tame, almost swept a portion of it away. The water kept rushing from the trench, and had not prompt action been taken to check its progress, probably much mischief would have been done. Fortunately there were some workmen engaged at the filter-beds, not far from the spot where the main burst, and no time was lost in diverting the traffic from the Lichfield Road. No steps could be taken to shut off the water until information had been sent to the works at Whitacre and Plants Brook. Ultimately the rushing water was stopped by closing the valves, and afterwards gangs of men were engaged in getting the water out of the trench in the main road. This work occupied the men until Wednesday morning, and it was not until the afternoon of that day that the pipe was repaired. During this time the supply of water for what is called the low level district had to come from the middle level district; but there was no fear of any serious interference with the general water supply of the borough, as there are three independent sources from which water can be obtained. Mr. Gray, the principal Engineer of the water department, was at the scene of the accident, and rendered very valuable aid.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The Dumbarton Corporation Gas Commissioners have just issued a statement of their accounts for the year ending Aug. 1, 1880. Including the gas-rental of £4068 8s. 9d., the year's revenue stands at £4860 5s. 6d.; and there is shown a profit on the year's transactions amounting to £682 4s. 11d., of which the sum of £655 is applied to meet the year's deficiency on Clyde Pier income. Up to the present time there has been an accumulated profit on the gas supply undertaking of the burgh amounting to £2549 18s. 8d.; and the sum of £1107 6s. 6d. has been expended in the purchase of the gas annuities.

At their annual general meeting, held a few days ago, the Fraserburgh Gas Company resolved to reduce the price of gas 5d. per 1000 cubic feet—from 7s. 11d. to 7s. 6d.

The second annual general meeting of the Falkirk Lighting Company, Limited, was held last Tuesday—Mr. J. M'Gilchrist, Chairman of the Company, presiding. Some formal business was first transacted, after which the Chairman submitted the annual report by the Directors, in which it was recommended that a dividend at the rate of 10 per cent. should be declared. In the course of a brief statement which he made, the Chairman mentioned that when they acquired the works for the old Company they had been in a dilapidated condition, and that the plant was in such a state as to be totally unfit to maintain a constant supply of pure gas of a high illuminating power. Now, however, things had been changed, the Company being in possession of a well-appointed gas-works. As the means of producing gas had been changed and improved, the Directors were turning their attention to the external surroundings, and he trusted that before the next annual meeting there would be great improvements in the buildings and enclosures—improvements which would materially add to the external appearance of the works. Their success during the past year was greatly due to the economical management of the works, and for the future they meant to economize still further where it was consistent with the production of a first-class article. They were determined also still further to lower the price of gas to the consumers, and they had recommended that the price should at once be reduced another 5d. per 1000 cubic feet, the reduction to come into force from the date of last survey. This reduction would, with those formerly made by the Company, amount to 1s. 3d. The effect of these reductions was beginning to make itself felt in the shape of increased consumption, and that again had compelled the Directors to look about for ground on which to make extensions. Very soon they would be in a position to supply gas to a population of 30,000. The report was adopted, together with the recommendation as to reducing the price of gas.

At a special meeting of the Alva Burgh Commissioners held last Wednesday, it was unanimously agreed to adopt the Burghs Gas Supply (Scotland) Act, 1876; and it was resolved to hold another meeting on the 22nd of November, to resume consideration of the question, and take the final steps, should there be no opposition. It was also agreed to transmit a copy of the minutes to each elector in the burgh.

The monthly meeting of the Police Board of Greenock was held last Tuesday, at which there was submitted a minute from the Law and Finance Committee, stating that they been called to consider the recommendation of the Gas Committee to hand over to the Police Board the sum of £3000 of gas profits, and to carry to the reduction of value of works £1100. The Committee, after a full discussion of the whole question, agreed that notice be given to rescind, at the next meeting of the Board, the resolution to pay over to the Board only £3000 as profits, instead of £4000, as in former years. On the motion of Provost Campbell, it was agreed to rescind the resolution. Councillor R. Shankland entered his dissent.

For the year ending May 15, 1880, the amount expended by the Police Commissioners of Leith for public lighting was £2554 2s. 2½d., the cost of the gas supplied to the public lamps standing at £1819 19s. 1d.

Business was done last Thursday in Glasgow Corporation 9 per cent. gas annuities at £225 10s.; and on the following day Edinburgh and Leith gas shares were wanted at £35, being a rise of 50s.

Dulness was the rule during last week in the Glasgow pig iron market, and there was a decline in prices daily, which amounted in all to 1s. 7½d. over the week. The lowest price reached was 48s. 2d., which was paid on Friday forenoon.

Some slight improvement is now showing itself in the coal trade, and by-and-by it is probable that the activity will be further increased.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

With regard to the coal trade of this district, there is little or no change to notice. For gas coals I do not hear of any inquiries in the market, business in these being practically over for the present season. Common round coals for steam and forge purposes still only meet with a very moderate demand, and continue very low in price. Engine classes of fuel remain firm as a rule, as there is not yet any largely increased quantity of slack being produced. The average quotations at the pit mouth may be given about as under:—Best Lancashire, 8s. to 8s. 6d. per ton, with good qualities offering at about 7s. 6d.; seconds, 5s. 9d. to 6s. 3d.; common round coal, 4s. 6d. to 5s. 3d.; burgy, 3s. 9d. to 4s. 3d.; good slack, 3s. to 3s. 6d.; and common about 2s. 6d. per ton.

There has been a considerable quantity of coal going away during the past week for coastwise shipments, and with some of the foreign ports, where the season will shortly close, a fair business is also being done; but there are still abundant supplies in the market, and very low prices are being taken; steam coal delivered either at Liverpool or Garston being offered at 6s. 3d. to 6s. 6d. per ton, and good second quality coal at about 7s. 6d. per ton.

Coke continues in dull demand at the prices quoted last week.

In the iron trade business for the present seems to be entirely at a standstill. Consumers are in no immediate want of iron, and as prices are week after week showing a downward tendency, they are naturally holding back any orders until it is apparent that quotations have touched their lowest point. Any sales at present being made are chiefly confined to a few odd parcels just sufficient to cover any pressing requirements, and the blast furnaces in the district are only kept going with deliveries which have still to be made on account of old contracts. Finished iron is also in less demand, and although some of the local forges are still busy, there are a good many complaints that very few new orders are being received. For delivery into the Manchester district the nominal quotations are about 49s. to 50s. per ton, less 2½, for Lancashire pig iron, and about £6 for bar iron; but offers for prompt delivery would be readily accepted at under these figures.

THE SOUTH STAFFORDSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

But little difference can be reported in the state of the local coal trade in this district over that of the past few weeks. As compared, however, with the business done six months ago, there is a perceptible improvement. The chief market at the present time is the demand for iron-making. Indeed, so much has the call for furnace coal increased, that at several collieries in the district the output is double what it was at the beginning of the year. It may also be stated that the number of iron-making furnaces in full work at the present time more than doubles the number of a twelvemonth ago, there being now in blast as many as 64 furnaces in the South Staffordshire district, while at the corresponding period of 1879 only 25 were in working order. This is the most striking feature that can be given of the improvement in the South Staffordshire trades. Household coals have not, as yet, been in much request in the way of autumn contracts, though there is a slight improvement in the output of the Cannock Chase district, and heavier tonnages have been loaded for transit for the South within the last week or two. Complaints, however, are made of the keenness of the competition experienced from other districts, and more particularly from the North Wales productions.

The gas coal trade is fairly good, but most of the largest contracts have been made up. Coke is in an improved state, and prices on the whole are much firmer.

The iron trade is reported to be somewhat quieter, though for a few sorts of manufactured iron there are numerous inquiries. The demand for pigs is still good, but the commoner classes are scarcely so firm. The overstocked state of the Middlesbrough markets have to a considerable extent affected the local trade. Best marked bars are a slow sale, though for unmarked qualities customers are still numerous. Strip iron, for tube-making, nail-rods, and plates, are receiving greater attention. Both girder and boiler plates are reported firmer. Sheets are, however, receiving the best call, and sellers are holding out for slight advances over the rates of a week ago. Singles are not to be had for less than £8, while a few shillings more are asked for the better qualities. Both smelters and finished iron makers are looking forward to the coming quarter-day, as likely to be productive of a distribution of orders and contracts for both raw and finished iron. Heavy ironfounders are tolerably well employed, as also are tube makers, and makers of colliery appliances.

THE YORKSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The position of the iron trade throughout the county has undergone but little change since my last notice. The works devoted to the output of manufactured iron vary a good deal. Throughout the South Yorkshire district mill and forge materials are not in over-active request, hoop iron being amongst the largest productions at the Milton and Elsecar Works. The small foundries are still in a very indifferent position, but at the Thorncliffe Works, where a large quantity of gas apparatus is usually made, workmen are well employed. The position of the Bessemer steel trade is still good, and at the Yorkshire steel and iron works the weekly output of rails and tires does not diminish. No falling-off can be noted with respect to the output of pig iron, there having been of late but little change to note respecting the furnaces in blast.

The coal trade in the West Yorkshire district is very quiet, yet the men and masters are in a much more settled state than in the southern part of the coal-field. The steam coal collieries have been the best off for orders for a long time, and have played a lively part with regard to the export trade of Hull and Goole; but the demand is somewhat quieter than it was.

Gas and locomotive coal are in fair request, and being for the most part supplied in connection with contracts, the sales do not vary a great deal. A meeting of the South Yorkshire Coalowners Association has been held since my last report, when the general aspect of the trade was considered. The Great Northern Railway contracts expire on the last day of the present month, so that some interest is being taken in their renewal by the district coalowners, who send most of their London traffic over the Company's line, and therefore look for a part of their patronage.

The coke trade is fairly active, although at some places the output has been diminished. There is, however, a large tonnage sent to North Lincolnshire and other places where smelting operations are carried on. Many of the ovens owned by Earl Fitzwilliam, between Hemingfield and Elsecar, are idle, and it is stated that in consequence of the damage done to the vegetation on his estate it is intended to limit the output. At several other collieries in the district the lessor of the minerals and the Sanitary Authorities have caused the owners to erect large chimneys to carry off the smoke.

A great deal might be written about the numerous strikes disputes, and pending reductions now going on in the South Yorkshire coal-field. The latest disputes or changes are at the Stanhope Silkstone Colliery, where the men have come out against a reduction. A demand for an alteration in the mode of working has been made at the Hoyland Silkstone Collieries, whilst at North Gawber Hall the owners ask for 5 per cent. reduction from all day men, and certain concessions from the miners, the pit not paying.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

It is unnecessary to repeat that as the nights continue to lengthen the demand for gas coals is increasing, and the shipments are active. They are not only from the Tyne, but from the Wear and Hartlepool. There is little, if any, alteration of prices, and the large business transacted in the shipments of gas coals to most parts of the world are being done at quotations which have prevailed over the summer, and which it is hardly probable will be much, if anything, altered this year. The general coal trade is doing a very good shipping business, but at prices which do not yield much profit to the proprietors of the collieries. There was a stoppage of a large shipping firm at Newcastle last week extensively connected with the coke trade to the Baltic, and it has had a very bad effect upon the market. Small steam coals are low in price, and are not much inquired after.

The demand for coasting tonnage to be employed in the gas trade is stronger, and freights have had a tendency to advance. Handy ships have been scarce over the last ten days. Higher rates have been paid to sailing vessels to take gas coals to Ireland; 7s. per ton Dublin, and 7s. 9d. per ton Waterford, were done on Saturday, and the chartering with the Eastern Counties, the Channel, and the North of France shows improved rates. A considerable amount of steam tonnage is employed carrying gas coals to London and the larger ports in the South of England at current rates of freight. Sailing tonnage has been engaged to carry coke to Spain and Africa, and the shipments of coke to such large ports as St. Petersburg and Riga are active. The outward shipping trade becomes more pressing with the rapid approach of the close of the Baltic season.

Except for very best sorts, the fire-brick trade of the Tyne, Wear, and Tees is dull. Shipments, except from two or three leading factories, are very slack. A moderate business is also transacted in cement. The chemical trade of this district does not improve, and prices can barely be maintained. There is a singular absence of continental business. The Cleveland iron trade shows no improvement. Prices have a somewhat drooping tendency. With larger supplies the price of British and foreign lead is lower. There is a moderate market for copper. The deliveries of timber, though not large, meet the requirements of trade, and prices are unaltered from last quotations.

MARTOCK (SOMERSET) GAS COMPANY.—As the result of a very large meeting of the inhabitants of Martock, Hinton, and Stoke-sub-Hamdon, a Gas Company has been established under the Limited Liability Companies Act, for the purpose of lighting these places with gas. The capital is £3000, in £5 shares.

ROTHWELL GASLIGHT COMPANY, LIMITED.—This is the registration title, dated the 20th inst., of a Company originally constituted by deed of settlement on the 18th of February, 1856, and completely registered under 7 & 8 Vict., cap. 110, on the 3rd of March, 1856. The capital is £8000, in £5 shares, the whole of which are allotted to 50 Shareholders, £5 per share being paid up upon 1100 shares, and £2 upon the remaining 500.

CONFERENCE OF MUNICIPAL AND SANITARY ENGINEERS.—On Friday last the first conference of the Northern District Branch of the Association of Municipal and Sanitary Engineers and Surveyors was held at Darlington, under the presidency of Mr. A. W. Morant, the Borough Engineer of Leeds. There was a numerous attendance of delegates. Papers were read on subjects connected with the disposal of sewage, by Mr. Craggs, of Shildon, and Mr. G. Bell, Surveyor to the Felling Local Board, and votes of thanks having been passed to those gentlemen, the company paid a visit to the works of the Darlington Iron Company and to the Darlington Corporation Sewage Farm. In the evening the members dined together, the President of the Association occupying the chair.

THE PRICE OF GAS AT BARNSLEY.—At the monthly meeting of the Barnsley Town Council, on Tuesday last—the Mayor in the chair—Mr. Wray asked the Chairman whether anything could be done with respect to the Barnsley Gas Company and the price charged for gas to consumers. He quoted a number of statistics relating to the price of gas in Sheffield, Leeds, Doncaster, Rotherham, and Wakefield, the price being lower than at Barnsley. He thought it was time some one looked into the matter. Mr. Blackburn agreed with Mr. Wray with respect to the charges made for gas. He gave notice to move that a Committee be appointed for the purpose of making inquiries, with a view to purchasing the present works or starting new ones. The Mayor intimated that he was in favour of the establishment of other gas-works. Mr. Craik said he should be glad to supply the Council with any quantity of gas at 1s. per 1000 feet less than they were now paying, if they would lay down the pipes. The subject then dropped.

SANITARY PRIZE ESSAY.—The Government of India has just offered a prize of £100 for the best "Manual of Hygiene," to serve as a text-book for the use of the British soldiers in that country. Works submitted in competition for this prize must be sent in by their authors to the Secretary to the Government of India in the Military Department at Calcutta, so as to reach his hands not later than the last day of next March. The work is "to be written in clear and simple English, and thoroughly practical, showing the ordinary causes affecting health, and the special dangers to which British soldiers are exposed in India, more particularly during their first year in the country, and the best means by which those dangers may be averted." The work, if accepted, will be printed at the public expense, and become the property of the State, and it is not to exceed in bulk "more than 50 or 60 pages of print, of small pica, octavo size." It is added that the Government of India will not feel bound to award the prize at all, unless one at least of the manuals produced in competition shall be judged "in all respects suitable to the purposes for which it is required."

HUDDERSFIELD CORPORATION WATER SUPPLY.—At the meeting of the Huddersfield Town Council on Wednesday, the 15th inst.—the Mayor (Alderman Walker) in the chair—a long discussion took place on the question of the disposal of the water-works surplus value fund. The Mayor having stated that he had received a memorial from the Huddersfield and District Teachers Association, praying the Council to take some steps with the object of establishing a free public library for the borough, Mr. W. Marriott moved—"That the fund called the water-works surplus value fund be applied to the purpose of a new technical school, and to the formation of a free library, in such proportions as the Council may deem fit," supporting his motion in a long speech. Alderman H. Hirst moved an amendment to the effect that the question of the application of the fund should be adjourned for future consideration. After a long and animated discussion, the motion was lost by a majority of 23, and the amendment consequently became the substantive motion. To this an amendment was moved, as follows:—"That the water-works surplus value fund be invested, and the income thereof applied to the purpose of providing a free library and a building for the same;" but on its being put to the meeting it was lost by a majority of 20. The amendment to the first motion was, therefore, carried, and the question of the application of the fund thus stands adjourned.

Register of Patents.

APPLICATIONS FOR LETTERS PATENT.

3696.—MASON, S., Birmingham, "Improvements in couplings of unions for taps and pipes." Sept. 11, 1880.
3720.—HADDAN, H. J., Westminster, "Improvements in liquid meters." A communication. Sept. 13, 1880.
3730.—POPE, A., Slough, Bucks, "Improvements in the manufacture of gas and in apparatus therefor, and for lighting and heating railway carriages, and for similar purposes." Sept. 13, 1880.
3759.—KITTO, C. W., Old Broad Street, and THOMPSON, W. H., Finsbury Circus, London, "Improvements in apparatus and arrangements for lighting buildings, ships, and other places." Sept. 16, 1880.
3785.—JACKSON, W. M., Providence, U.S.A., "An improvement in machines and process for carburetting gas and air." (Complete specification.) Sept. 18, 1880.
3791.—CHATWOOD, S. and S. R., Bolton, Lancs, "Improvements in burners for and apparatus for obtaining light by the combustion of gas or inflammable vapours." Sept. 18, 1880.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

995.—BOUTEYRE, A. DE (A. E.), Paris, "Improvements in gas furnaces for melting glass." March 8, 1880.
1060.—RAMSBOTTOM, J., Alderley Edge, Chester, "Improvements in the construction of apparatus for working the expansion valves of steam, air, or gas engines." March 11, 1880.
1092.—WRIGHT, F., Baker Street, London, "Improvements in gas-regulators." March 13, 1880.
1121.—HAMER, P., Skegness, Lincoln, "Improvements in giving motion to the valves of water-meters and in apparatus or appliances therefor." March 16, 1880.
1181.—CLARK, A. M., Chancery Lane, London, "Improvements in apparatus for effecting the absorption and washing of gases and vapours." A communication. March 18, 1880.
1221.—WEST, J., Maidstone, Kent, "Improvements in apparatus for breaking coal, and for charging and discharging gas-retorts." March 22, 1880.
1238.—THOMPSON, W. P., Liverpool, "Improvements in gas heating apparatus or apparatus in which gas is burned on the Bunsen principle." A communication. March 23, 1880.
1253.—MORLEY, C. W., Regent's Park, London, "An improvement in galleries or globe holders." March 24, 1880.
1257.—QUITMANN, C., Jewin Crescent, London, "Improvements in extinguishing apparatus for lamps." A communication. March 24, 1880.
1310.—YOUNG, W. C., Poplar, London, "Improvements in the manufacture of sulphate of ammonia." March 30, 1880.
1537.—MORGAN-BROWN, W., Southampton Buildings, London, "Improvements in fluid-meters." A communication. April 15, 1880.
2964.—IMRAY, J., Chancery Lane, London, "Improvements in apparatus for distilling ammoniacal liquor." A communication. July 19, 1880.

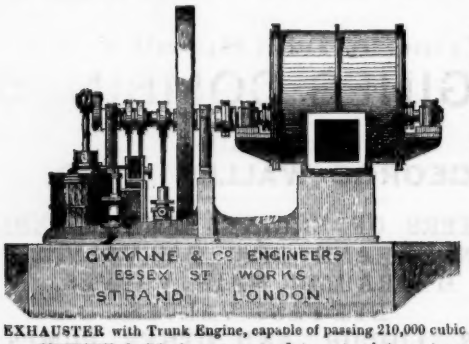
PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2787.—TIDCOMBE, G., "Improvements in means or apparatus for heating and ventilating greenhouses and other places by means of gas." July 21, 1877.
2843.—LAKE, W. R., "Improvements in water-meters." July 25, 1877.
3003.—TARRAR, G., "Improvements in galleries for gas and other lamp glasses." Aug. 7, 1877.
3024.—MILLS, E. C., and HALEY, H., "Improvements in motive-power engines worked by the explosion of gas." Aug. 8, 1877.
3051.—RICHARDIN, C. H., "Improvements in gasaliers and other pendent lights." Aug. 10, 1877.
3143.—THOMPSON, W. P., "Improvements in and appertaining to ball or spherical valves." Aug. 18, 1877.
3189.—MATHER, W., "Improvements in apparatus for boring and well sinking." Aug. 22, 1877.
3307.—HADFIELD, R., "Improvements in gas checks." Aug. 30, 1877.
3311.—MARRIOTT, W., "An improved process or method of purifying gas." Aug. 30, 1877.
3330.—FOULIS, W., "New or improved apparatus for lighting and extinguishing gas lamps, part or parts thereof acting as governors for lamps or for analogous purposes." Sept. 1, 1877.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

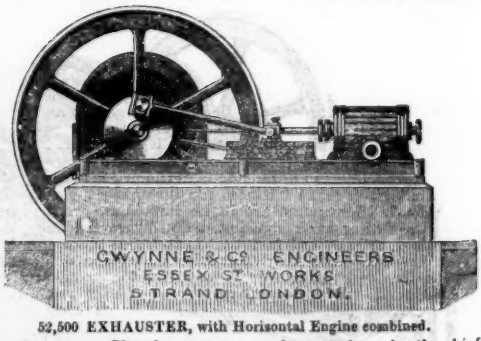
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—*"Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship."*

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED.—The Advertiser, a Young Man, aged 39, married, is open for an Engagement as MANAGER and SECRETARY of a medium-sized Gas-Works, or SUB-MANAGER of a large Works. Has a thorough Knowledge of the Manufacture and Distribution of Gas in all its branches, having had sole management of Gas-Works for 16 years. Highest testimonials and references.
Address No. 678, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER, aged 30, with experience as RETORT-SETTER, wants Situation in Gas-Works. Can do Mason work in all its branches. At present in Leith Gas-Works. Good references from present and former employers.
Address W. SWAN, 56, Bridge Street, North Leith, SCOTLAND.

WANTED, by the Portsea Island Gas Company, a METER REPAIRER. He must be thoroughly acquainted with the mode of Testing and Repairing Wet and Dry Meters.
Address S. B. DARWIN, Secretary.

CORPORATION OF BIRMINGHAM—GAS DEPARTMENT.

THE Gas Committee are about to appoint an ASSISTANT SECRETARY. Salary £200 a year.
Applications for the appointment to be made, by letter only, marked "Assistant Secretaryship," before the 7th of October. Candidates to state their age, which should not exceed 35, qualifications, and present occupation. Copies of not more than two testimonials may be sent.
A previous acquaintance with the work of a gas undertaking is not essential.
EDWIN SMITH, Secretary.
Offices of the Gas Department, Old Square, Birmingham.

LAMP COLUMNS.

WANTED immediately, from 50 to 60 LAMP COLUMNS.
For particulars, apply to S. CROSS, Manager, Gas-Works, ABERGAVENNY.

WANTED, Offers for the "Journal of Gas Lighting" from January, 1856, to June, 1880. Uniformly half bound, cloth, lettered, 34 Vols. in all, in perfect condition, and equal to new. Later years are in half-yearly volumes. Also Four Vols. of "American Gaslight Journal," from 1870 to 1874 inclusive. Bound in cloth, lettered, and in perfect condition.
Address No. 694, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ON SALE—The Cast-Iron Fire Doors, Mouthpieces, Ascension, H, and Dip Pipes, Hydraulic Mains, &c., belonging to six settings of six retorts; One Station Meter to pass 8000 feet per hour (makers West and Gregson); also nine D-shaped clay retorts, 16 in. by 14 in. by 8 feet.
The above are in capital condition, and can be seen at the Gas-Works, Guildford. No reasonable offer refused.
Further particulars on application to Mr. LONGWORTH, Gas Offices, GUILDFORD.

FOR SALE.—In consequence of the decease of Mr. Milne, a GAS-WORKS in a small Manufacturing Town in Ulster. Present make 1½ millions, which might be increased.
For particulars apply to ALEXR. MILNE AND CO., Gas-Works Lessees and Engineers, 11, Chichester Street, BELFAST.

GARSIDE'S IMPROVED MAIN DRILLING CLIP.
No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.
GARSIDE'S REGISTERED TUBE-VICE takes ⅜ brass to a 2-in. Socket.
May be had direct from the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

RIO DE JANEIRO GAS COMPANY, LIMITED.
The Shareholders are informed that the Transfer Books will be closed from the 24th inst. to the 5th of October next, both days inclusive.
THOMAS DAWSON, Secretary.
No. 1, Gresham House, Old Broad Street,
London, E.C., Sept. 24, 1880.

VALUABLE SHARES IN ESTABLISHED UNDERTAKINGS.

MESSRS EDWIN FOX & BOUSFIELD will SELL, at the Mart, on Wednesday, Oct. 13, at Two, FIFTY £20 SHARES (paid up) in the Brighton and Hove Gas Company; the dividend for some time past has been at the maximum rate of 7 per cent.; 100 fully-paid £10 (8 per cent. Preference) Shares in the Doom Dooma Indian Tea Company, one of the most flourishing tea companies of the famed Assam district, with a capital of £150,000, having 1435 acres under cultivation; Ten £20 Shares in the Harrow Water-Works Company, fully paid, with dividend now due, average 12½ per cent.; 50 £10 Shares (£7 paid) in the Queen's Hotel Company, Limited, Upper Norwood, average dividend 7 per cent.; also 20 £20 Shares (£15 paid) in Messrs. Dewar, Son, and Sons, average dividend 7 per cent.
Particulars at the Mart; and of MESSRS. EDWIN FOX AND BOUSFIELD, 99, Gresham Street, BANK.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—
About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12-in. Slide-Valves and 12-in. Connections.
Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12-in. Connections.
Exhauster (Jones) to pass about 15,000 feet per hour.
Exhauster (Beales) to pass about 25,000 feet per hour.
Two Vertical Steam-Engines, each about 6-horse powe with Pulleys, and Shafting used for driving the above.
Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.
4-horse power Horizontal Steam-Engine.
Three 4-in. Pumps, with cranked Shafting and a pair of Mitre Wheels.
Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.
Gasholder, Double Lift, with Cast-Iron Tank, capacity 87,000 feet.
Gasholder, Double Lift, capacity 100,000 feet.
Gasholder, Double Lift, capacity 240,000 feet.
One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.
Two 12-in. four-way faced Valves, by Cockey.
For further information, &c., apply to the undersigned.
R. MORLAND, Engineer.

SOUTHPORT CORPORATION GAS-WORKS.

TO IRONFOUNDERS AND OTHERS.

THE Gas Committee invite Tenders for the Supply and Erection complete of a Cast-Iron ROOF required at the Gas-Works, Crowlands.
Plans and specification may be seen at Mr. Booth's Office, Eastbank Street, Southport.
Tenders, endorsed "Roof," to be sent in to me not later than Wednesday, the 29th inst.
By order,
J. H. ELLIS, Town Clerk.
Town Hall, Southport, Sept. 16, 1880.

SOUTHPORT CORPORATION GAS-WORKS.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee are prepared to receive TENDERS for the Surplus TAR produced at the Gas-Works for a period of One or Two years from the 18th of November next.
Further particulars may be obtained on application to Mr. Booth, Gas Manager.
Tenders, endorsed "Tar," to be sent in to me not later than Wednesday, Oct. 27 next.
By order,
J. H. ELLIS, Town Clerk.
Town Hall, Southport, Sept. 25, 1880.

THE Eccleshill Gas Company invite TENDERS for the Surplus TAR and AMMONIACAL LIQUOR to be produced at their Works, together or separately, for One year, from the 1st of October next. Can be delivered in Contractors tanks, if required, at Eccleshill Station (G.N.R.) Coal carbonized, per annum, 1500 tons.
Tenders, sealed and endorsed, to be sent to the undersigned not later than Monday, the 4th of October next.
J. MELLOR, Secretary.
Gas-Works, Eccleshill, near Leeds, Sept. 16, 1880.

SMETHWICK LOCAL BOARD OF HEALTH—GAS DEPARTMENT.

SMETHWICK GAS-WORKS CONTRACTS Nos. 7, 8, 9, AND 10.

TENDERS are required for the above four Contracts, or for any one or more of them.
The work comprised within these contracts will consist of—
Contract No. 7.—A Station-Meter to pass 30,000 cubic feet per hour, erected and put to work complete with Bye-passes, Valves, &c.
Contract No. 8.—A Weigh-bridge, to weigh up to 10 tons, erected and fixed complete and set to work.
Contract No. 9.—A pair of Beale's Exhausters and Engines combined (each Exhauster capable of exhausting 25,000 cubic feet per hour), fitted with Bye-pass, Throttle, Governor, and Valves complete; two Lancashire Boilers, each 17 ft. long by 5 by 6 ft. diameter, with their Fittings and the Floor-plates, Bearers, &c., in the Engine and Exhauster House and Meter House.
Contract No. 10.—The Mouthpieces, Fire Furniture, Ascension-Pipes, and Hydraulic Mains for 56 Double-ended Retorts, Condensing Apparatus and Washers and Scrubbers, and the General Main-laying about the Works.
The tenders for Contracts Nos. 7 and 8 must be accompanied by a reference to a Station-Meter or Weigh-bridge (as the case may be) of about the same size as that which the tender is for, and which has been erected by the tenderer, and is successfully at work within 30 miles of London or Birmingham.
Each tender is to state the time at which the contractor will complete each separate contract.
As above stated, the tenders may be for each contract separately, or may be for either one or more, or the whole of them.
The tenders, endorsed "Tender for Contract No. 7, 8, 9, or 10," as the case may be, and addressed to the Clerk of the Local Board, Public Buildings, Smethwick, must be delivered on or before Oct. 11, 1880.
Plans and specifications may be seen at the Smethwick Gas-Works, on application to Mr. Moody, Clerk of the Works.
The lowest or any tender will not necessarily be accepted.
By order,
EDWIN DOCKER, Assistant Clerk.
Public Buildings, Smethwick, Sept. 22, 1880.

EXHIBITION OF APPARATUS FOR THE **UTILIZATION OF GAS, ELECTRICITY, &c.,** BURNBANK DRILL HALL, GT. WESTERN ROAD, GLASGOW.

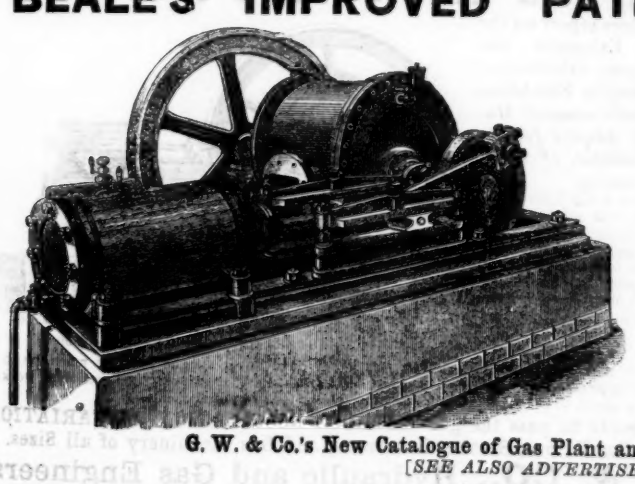
OPEN FROM 10 A.M. TILL 10 P.M.
Commencing Sept. 28.

Every kind of Gas Apparatus and Appliances of the most improved character. The Largest Gas Light in the World; the Albo-Carbon Light; Dr. Adams's and other Gas-Heating and Cooking Stoves; Gas-Meters in great variety, shown in action; Gas-Engines at work; Gas-Tar Products, including the latest triumphs in obtaining brilliant colours from the Tar Pit; Shale Oils and Gasoline Machines; Grand Display of Oil Lamps; Various Systems of Electric Lighting; Lighthouse Apparatus; Gas-Lighted Buoy in action; Telephones; Fog-Signalling Apparatus; Water-Engines and latest forms of Water-Meters; Miners Safety Lamps of many forms, including a "Geordie" of 1816, and a "Davy" of 1820; Fire-Damp Indicators; Great Collection of Scotch Cannel Coal Specimens.
Course of Special Lectures by eminent Scientific Men on Subjects Illustrated by the Exhibition.
Family Season Ticket, £1 1s.
Single Season Ticket, 5s.; with Lectures, 7s. 6d.
Single Admission—Opening Day, 2s. 6d.; following Days, 1s.
Refreshment Department conducted by Messrs. THORNTON (late Duncan's), Buchanan Street.
JOHN MANN, C.A., 154, St. Vincent Street,
Secretary to Committee.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS,

WITH

Wrought-Iron Spindles and ENGINES COMBINED.



SOLE MAKERS,

GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

[*SEE ALSO ADVERTISEMENT, PAGE 514.*]

Phœnix Engineering Works:
HOLLAND STREET, SOUTHWARK, S.E.

MR. CORBET WOODALL, C.E.,

Has Removed his Office to

PALACE CHAMBERS, BRIDGE STREET,

WESTMINSTER, S.W.

NOTICE OF REMOVAL.

THE Owners of the Birtley Iron-Works and Pelaw Main Collieries have REMOVED their London OFFICES from 101, Cannon Street, to No. 46, Cannon Street.

Their Warehouse for Gas and Water Pipes and other Castings, &c., is at Scott's Wharf, Bankside, Southwark, LONDON.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

LOANS.

A Small old-established Provincial Gas Company, secured by Provisional Order, and having a clear net income of £800 per annum, is desirous of BORROWING a sum of £3500 at 5 per cent. per annum on Debenture Stock, to be laid out in Extensions of the Plant, the Stock to be transferable in sums of Five pounds, or any multiples thereof. No Debenture Stock or Bonds having been issued up to the present time, this Stock will be the first charge upon the undertaking.

Applications to be made before the 1st of October next to W. LIVESEY, 6, Victoria Street, WESTMINSTER, S.W.

TO METER MANUFACTURERS.

THE Gas Committee of the Corporation of Warrington are prepared to receive TENDERS for One STATION-METER to pass 60,000 cubic feet per hour, under a pressure of three-tenths, with Bye-pass and 18-in. Connections. Also a 20-in. STATION GOVERNOR to be actuated by water, 20-in. Connections, two Hydraulic and one Slide-Valve, with pillar for Bye-pass; the whole to be erected complete on their Works at Warrington.

Sealed tenders, endorsed "Tender for Station-Meter," must be delivered to the undersigned not later than Thursday, the 14th of October next.

The Committee do not bind themselves to accept the lowest or any tender.

JAMES PATERSON, Engineer.

Gas Offices, Mersey Street, Warrington,
Sept. 16, 1880.

TO ENGINEERS AND IRONFOUNDERS.

THE Gas Committee of the Corporation of Warrington are prepared to receive TENDERS for HYDRAULIC MAIN, ASCENSION PIPES, and other RETORT-HOUSE FITTINGS.

Plans and specifications may be seen at the Offices of the undersigned, and copies of the same may be obtained on payment of 10s., which will be returned on receipt of a *bona fide* tender, which must be endorsed "Ironwork Contract, No. 12," and delivered not later than Thursday, the 14th of October next.

The Committee do not bind themselves to accept the lowest or any tender.

JAMES PATERSON, Engineer.

Gas Offices, Mersey Street, Warrington,
Sept. 16, 1880.

STOKERS GLOVES.

GEO. BOULTON & SON,

WHOLESALE

GLOVE MANUFACTURERS,

75, GOSWELL ROAD,

LONDON, E.C.,

Will be pleased to send Sample Patterns and Prices to the Managers and Engineers of Gas Companies, similar to those which have been supplied by them to most of the London Gas Companies for Twenty-five years past.

Price 28s. each, handsomely bound in Morocco, cloth sides, gilt edged and lettered.

THE FIRST AND SECOND VOLUMES OF

KING'S TREATISE

On the Science and Practice of the Manufacture and Distribution of

COAL GAS.

Edited by THOS. NEWBIGGING, C.E., M.Inst.C.E. and W. T. FEWTRELL, F.C.S.

Orders received by
WALTER KING, 11, Bolt Court, Fleet Street, London, E.C.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.

Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.

GEORGE ORME & CO.,

ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

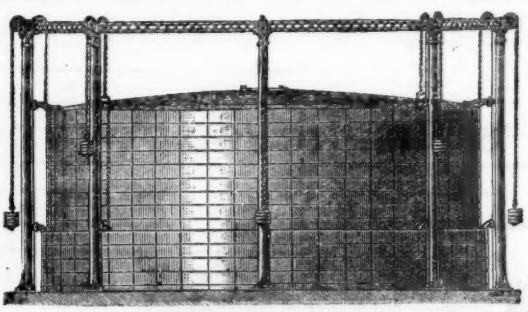
EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.



J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

EAST GRINSTEAD GAS AND WATER WORKS.

TO GAS ENGINEERS.

CONTRACT No. 7.

THE Directors of the East Grinstead Gas and Water Company are prepared to receive TENDERS for the Construction and Erection of a Set of Two PURIFIERS, 8 ft. square, and a SCRUBBER, 2 ft. 6 in. diameter by 29 ft. high, at their Gas-Works, East Grinstead, in the county of Sussex.

Specifications can be obtained on payment of 10s. 6d. each, and the drawings and particulars can be seen at the Office of the Engineer, Mr. Edward Easton, C.E., 9, Delahay Street, Westminster, S.W.

Sealed tenders, endorsed "Tender for Purifiers and Scrubber," must be sent in to the Company's Secretary, at East Grinstead, on or before Oct. 5, 1880.

The Directors do not bind themselves to accept the lowest or any tender.

E. A. HEAD, Secretary.

Gas and Water Company's Office,
East Grinstead.

CHESTER UNITED GAS COMPANY.

Sale by Tender of £10,000 of Ordinary Stock, being a portion of the additional Capital authorized to be raised by Resolution passed at a General Meeting of Proprietors, held on the 9th of August, 1880, in pursuance of the powers of the Chester Gas Act, 1880.

THE Directors of the Chester United Gas Company give Notice that they will be prepared to receive, not later than Ten o'clock a.m., on Thursday, the 7th day of October, 1880, sealed TENDERS for £10,000 of ORDINARY STOCK, bearing a maximum dividend of £7 per cent., in Lots of £100 each nominal value.

The Capital now offered is required for the Extension of the Company's Works, to enable them to meet the increased demand for Gas.

Forms of tender can be had at the Offices of the Company, at the Roodee, Chester, or will be sent by post on application.

By order,
JAMES PYE, Secretary.

Gas Offices, Roodee, Sept. 6, 1880.

THE Leyland and Farington Gas Company are prepared to receive TENDERS for the TAR and AMMONIACAL LIQUOR produced at their Works during Twelve Months commencing Oct. 1st, 1880—quantity produced about 70 tons of Tar and 150 tons of Liquor—delivered in buyer's tanks at Leyland Station.

Tenders to be sealed and endorsed.

CHARLES ELLIOTT, Secretary.

Leyland, near Preston.

THE

SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

GAS APPARATUS EXHIBITION IN GLASGOW.

PHILP'S COCKBURN HOTEL,

141, BATH STREET, GLASGOW.

This Large New Hotel is in connection with the well-known Cockburn Hotel, Edinburgh, and conducted on the same principles.

CHARGES MODERATE.

Special Terms for Parties staying a week or longer.

J. PHILP, PROPRIETOR.

ERECTION of CHEMICAL PLANT.

SULPHATE OF AMMONIA APPARATUS.

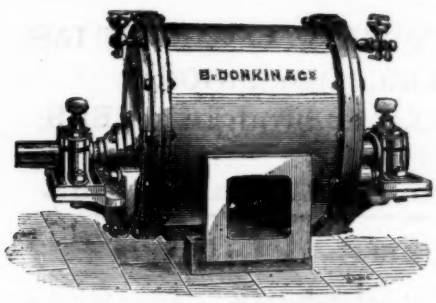
CONTINUOUS METHOD.

Improved "Coffey Still" Process and other Methods.

Apparatus for Making Gray or White Sulphate of Ammonia from Nitrogenous Bodies.

Models of above plant supplied, price £3 10s. and £6 10s., or plans at moderate rates. Assistance given to persons making experiments.

JOHN G. HARVEY, 84, CODOURG STREET, LEEDS.



NEW PATENT GAS-EXHAUSTERS.

[J. BEALE'S.]

MESSRS. B. DONKIN & Co. possess the sole right to manufacture J. Beale's Exhausters under his new patent.

MADE WITH TWO OUTSIDE BEARINGS AND LATEST IMPROVEMENTS.

ALSO MANUFACTURERS OF

IMPROVED GAS AND WATER VALVES, STEAM-ENGINES, &c., &c.

B. DONKIN & Co., BERMONDSEY, LONDON.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM.

WARNER'S RETORT-HOUSE MACHINERY.

[*As Illustrated and Described in the* JOURNAL *for May* 4.]

Communications to be addressed to

W. J. WARNER, GAS-WORKS, SOUTH SHIELDS.

LIVESEY'S PATENT WASHER.

This apparatus effects the most intimate contact between the liquor with which it is supplied and the gas passing through it, resulting in the complete removal of all particles of tar, increasing the ammonia strength of the scrubber and condenser liquor, and removing a large proportion of other impurities—notably, carbonic acid. The Washer is intended to work in conjunction with a scrubber. It occupies little space, and is inexpensive. It does not become clogged with tar or corroded by the action of the liquor or gases, it gives three inches of pressure, and only needs a supply of liquor to keep it in regular action without any further attention. It has been in constant successful use for five years, and is now in operation in upwards of fifty places.

Prices, fitted and fixed complete, exclusive of Valves and Connections; all foundations and unskilled labour required in erection to be provided by the Gas Company:—

Quantities to pass in cubic feet per 24 hours	100,000	250,000	500,000	750,000	1 million	1½ million	2 million	3 million	4 million
Price each	£30	£50	£70	£95	£120	£165	£200	£280	£360

For further Particulars apply to

Messrs. DEMPSTER AND SONS, ELLAND, HALIFAX, for the North;

Messrs. BAILEY, PEGG, AND CO., Bankside, LONDON, S.E., for the South;

Messrs. WILLEY AND CO., Commercial Road, EXETER, for West of England and South Wales;

Or to the PATENTEE, 589, OLD KENT ROAD, LONDON, S.E.

The understated declaration with which we introduced our apparatus when the Argand system was in the full tide of its fame, has been fully borne out by general experience, namely—

"THE FLAT-FLAME IS THE ONLY PRACTICABLE SYSTEM FOR STREET LIGHTING; and, 'in actual use,' yields as much light with Common Gas, and more with Cannel Gas, than any Argand System."

CHARLES HUNT, Esq. (President of the British Association of Gas Managers), in his Inaugural Address to the members at their annual meeting, held in London, June, 1880, said: "Rivalry has stimulated into being, for outdoor purposes mainly, Burners of large power, that have fully maintained the superiority of coal gas over the electric light. To Mr. Bray our thanks are due for his development of the **FLAT-FLAME BURNER** into a lighting medium of a very high order, *and for his vindication of its claims to practical consideration.*"

The above declaration was received with marked applause by the crowded meeting.

BIRMINGHAM LAMP TESTS.

AFTER the most exhaustive series of experiments, extending over more than twelve months, with the most extensive assortment of Burners and Lanterns of large lighting power ever brought together, the Birmingham Authorities have

ADOPTED BRAY'S SYSTEM

for their Street-Lighting Improvements, for which purpose Sixty-Five 100-candles power Lanterns of medium lighting power are being fixed.

The apparatus used in the above tests were all of our usual medium lighting power class, and the tests showed that we sacrifice a considerable amount of lighting power for general efficiency. The tests further showed that our 80-*candles* HIGHEST *lighting power burner yielded* 3·51 *candles per foot of gas—the quality being* 16·75 *candles* (3·35 *per foot*) *by the standard—which was a higher result than that yielded by any other flat-flame burner, though copies of our Slit-Unions, enlarged and improved by us Jan.,* 1879, *were used by our competitor; and higher than the* 80-*candles power Argands.*

NOTE.—The above is the most conclusive answer to the ever-changing and misleading statements which are being made by our competitor, with the object of taking from us the honours we have secured in open contest.

Extract from the *Leeds Mercury*, April 1, 1880.

At the meeting of the Leeds Town Council, March 31, Alderman Gaunt moved that the Council approve of the acceptance by the Corporate Property Committee of the tender of Messrs. Geo. Bray and Co. for the supply of 21 new lamps, to be placed upon the pillars round the Town Hall. The Committee had tested Sugg's and other lamps, and found Messrs. Bray's the best. It was intended to have two 200-candles power and two 100-candles power, and 17 round the hall of 80-candles power. Mr. Lynd, in seconding the motion, said that he had had an opportunity of seeing different lamps tested at Birmingham, and he was in favour of Messrs. Bray's.

Extract from the *Daily Free Press*, Aberdeen, Jan. 1, 1880.

Judging of the merits of the lights as they appeared last night, on-lookers seemed to be generally of opinion that between Sugg's patent and Bray's larger light at the corner of Union Buildings, Castle Street, there was no perceptible difference in the illuminating power. When the vital question of gas consumption is taken into account, it is found that in the Castle Street lamps there is a marked difference in the quantity of gas consumed, for while 30 feet of gas are hourly burned in Sugg's Patent Lamp, only 20 feet are used by Bray's Lamp during the same period.

[**The above Lamps have Meters attached.**]

BRAY'S LANTERNS have been adopted by the Vestry of St. George, Hanover Square, London, for all the crossings and refuges of that important district, after a direct competition with the Argand system of lighting.

Also more than 50 Towns and Vestries have adopted them, after a similar competition in most cases; and many private users. In all cases they are a pronounced success.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

June, 1880.

REAL *v.* FANCIFUL IMPROVEMENTS

IN

GAS-METERS.

THE only practical difference between the WARNER & COWAN METER, and any ordinary Wet Meter, is in the measuring drum.

To perfect the Wet Meter, it was only necessary to make the drum unvarying, and so, to meet the proverbial instability of water, by constructing a measuring chamber which should be unaffected by the level of the liquid in which it moved. There was really nothing else required, and it is well to keep this in view, when asked to consider other (so-called) improvements. These, when examined, will in every case be found to deal with fanciful defects, relating, often, to the most trifling details of the construction and arrangement of the case and its appendages, leaving the drum in its old imperfect condition—a varying drum, and therefore an inaccurate Meter.

THE WARNER & COWAN METER

Possesses an UNVARYING DRUM as its basis, and in this respect is unique among Meters, whilst in the subsidiary arrangements above referred to, it is at once the simplest and most perfect Meter made.

W. & B. COWAN,

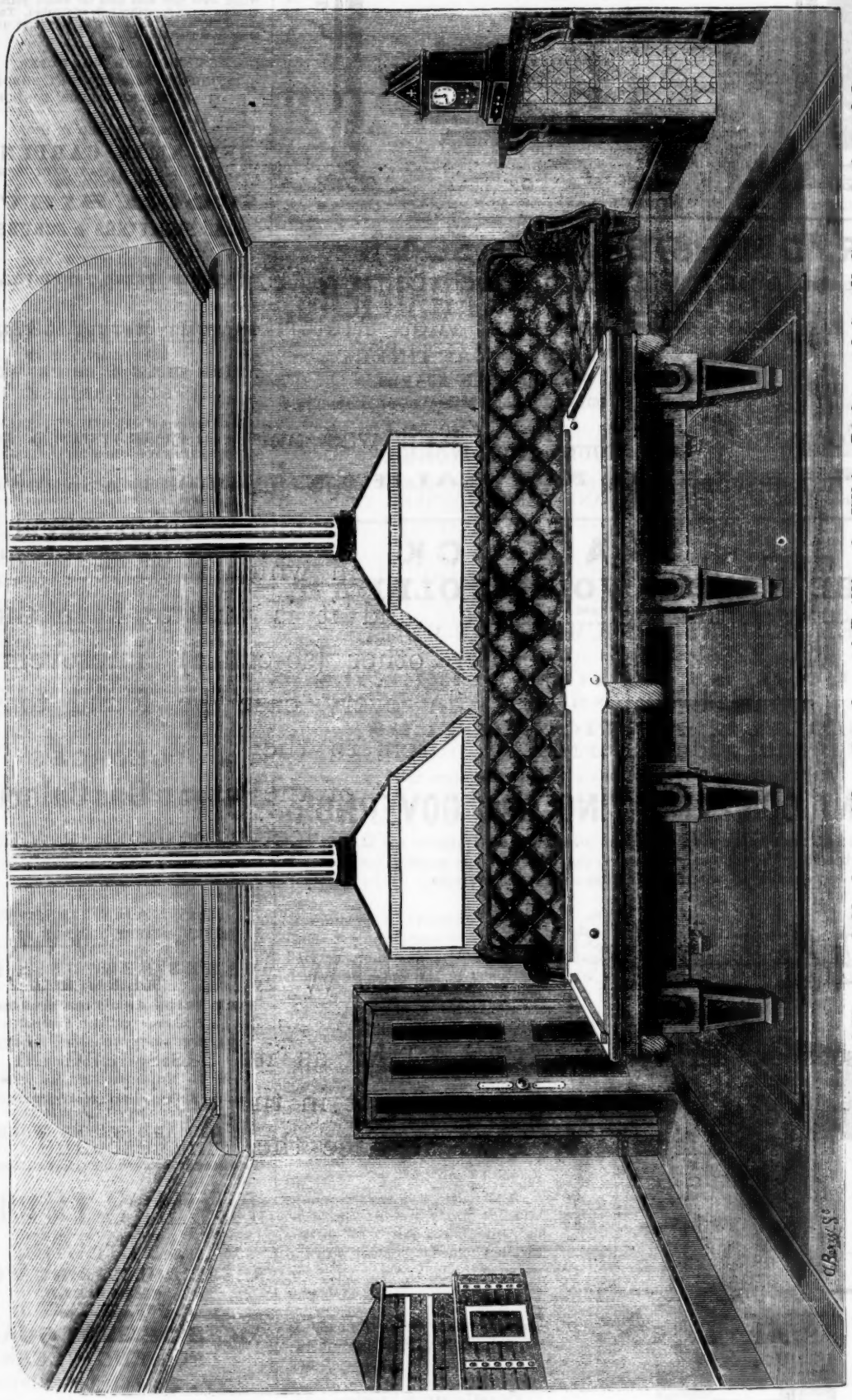
(ESTABLISHED 1827,)

CHURCH ST., MILLBANK ST., *LONDON, S.W.* | DUTTON ST., NEW BRIDGE ST., *MANCHESTER.* | BUCCLEUCH ST. WORKS, *EDINBURGH.*

THE LATEST NOVELTY

FOR THE EFFECTIVE LIGHTING of BILLIARD TABLES.

BILLIARD TABLE LIGHTING BY WILLIAM SUGG'S PATENT SELF-VENTILATING SYSTEM AND BURNERS OF HIGH ILLUMINATING POWER,



Securing a Total Absence of Heat and Shadow, with a Steady and Brilliantly White Light, and Small Consumption of Gas.

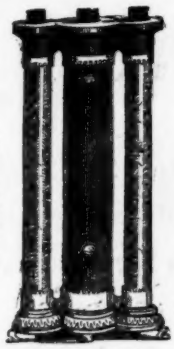
N.B.—All products of combustion are carried away into the open air, and cannot, therefore, mix with and vitiate the atmosphere of the room.

One of the above has been fitted up in the Billiard-Room of the Raleigh Club, Regent Street, and the Secretary states that the Table is the best lighted he has ever seen.

APPLY TO

WILLIAM SUGG,

VINCENT WORKS, WESTMINSTER, & GRAND HOTEL BUILDINGS, CHARING CROSS.



For Heating only.

RITCHIE'S
GAS OR OIL
HEATING AND LIGHTING
STOVES.

Silver Medal awarded in 1878, at Wolverhampton Exhibition.

No Injury to Pictures or Plants.
No Flue.
No Danger from Fire.
No Offensive Smell.
Light and Warmth combined.
Cost less than other Fuel.

Messrs. RITCHIE & Co. are prepared to supply these Stoves on the best possible terms to Gas Companies to let out to their Consumers on the hire system.

Prices from 50s. to £10 10s.

Full Particulars and Testimonials forwarded on application to

RITCHIE & CO.,
23, ST. SWITHIN'S LANE, LONDON, E.C.

For Light & Heat.

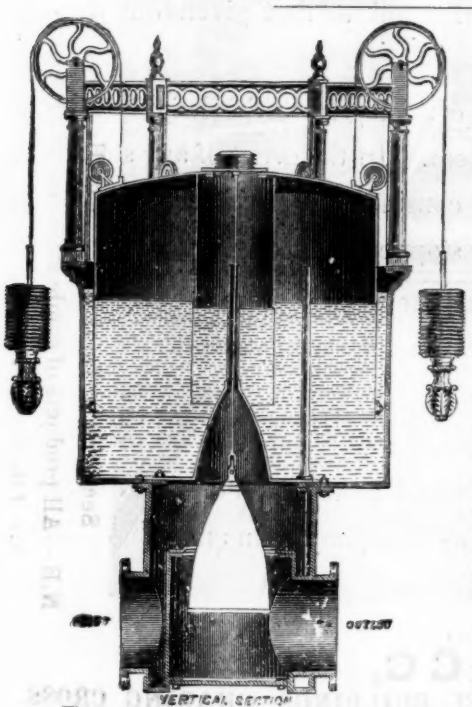
R. DEMPSTER AND SON'S
WOOD SIEVES FOR PURIFIERS,
WITH TAPER OR PARALLEL BARS,
MADE BY SPECIAL MACHINERY.
SCRUBBERS FILLED WITH BOARDS,
On our approved principle, for the extraction of Ammonia.
Prices on application. References to First-Class Engineers.
ROSE MOUNT IRON-WORKS,
ELLAND, NEAR HALIFAX.
LONDON OFFICES: 2, SUFFOLK LANE, CANNON STREET, E.C.

J. & J. BRADDOCK,
GLOBE METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET AND DRY CONSUMERS GAS-METERS,
OF THE HIGHEST EXCELLENCE ONLY;
ROUND STATION-METERS,
ON CAST-IRON STANDS;
SQUARE STATION-METERS,
WITH PLANED JOINTS.

Messrs. BRADDOCK beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 30-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

C. & W. WALKER'S
WOOD PURIFIER SIEVES,
Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, NEAR NEWPORT, SHROPSHIRE.
FINSBURY CIRCUS, LONDON.

ESTABLISHED IN 1860.
BENJAMIN CARPENTER,
THE ORIGINAL MANUFACTURER OF THE IMPROVED
WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.

PROVIDENCE WORKS,
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE
FIRE CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,

Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

GEORGE'S
Patent Gas Calorigen,
A STOVE FOR
WARMING AND VENTILATING.
RECOMMENDED BY DR. RICHARDSON.

MANUFACTURERS:
J. F. FARWIG & CO.,
36, QUEEN STREET, CANNON ST., LONDON.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE
FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY,
and every Article suitable for
GAS AND WATER WORKS.

Gold Medal Awarded, Paris Exhibition, 1878.

THOMAS TURTON AND SONS,
SHEAF AND SPRING WORKS,
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS,
STEEL OF ALL DESCRIPTIONS,
SCREW STOCKS, TAPS, AND DIES, SPANNERS
RATCHET BRACES, LIFTING-JACKS,
ANVILS, VICES,
AND ENGINEERS TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

THE

MANN & WALKERS' PATENT SCRUBBER.

Extensive use.

The successful and extensive use of the Mann and Walkers' Patent Scrubbers in all parts of the world has demonstrated their advantages, and entitled them to be received with credit and confidence. The number of them in use is about twenty times that of any other known means of purifying gas from ammonia.

Small quantity of Water required.

By a very small quantity of clean water (not more than 5 or 6 gallons per ton of coals carbonized) the whole of the Ammonia contained in the Gas is completely absorbed; the Gas, after only once passing through, issuing from the Scrubber outlet completely purified from Ammonia. The Scrubber gives no appreciable back pressure.

Residual Product obtained.

The Residual Product—namely, the Ammoniacal Liquor—is obtained at from 20 to 30 ounces commercial strength, which enables it, after being mixed with the weaker Liquor from the hydraulic main and condensers, to be sold to the Manufacturing Chemists, or converted into Sulphate, at the degree of strength found most profitable to the Gas Company.

Illuminating power increased.

The Scrubber is a Saturator, and the Gas being soaked in this strong solution of Ammonia in the lower columns of the Scrubber, is purified from a large amount of Carbonic Acid, and its Illuminating Power is thereby increased.

Small amount of power required.

The friction is so little, and the motion so slow, that the power necessary to work the Scrubber is almost inappreciable. A small gas-engine will work a pair of Scrubbers, purifying 2 million cubic feet of gas per day.

Beckton Gas-Works.

There are thirty of these Patent Scrubbers in the Beckton Gas-Works, equal to purifying 30 million cubic feet per day, and the total amount of engine power necessary to work the whole 30 is not equal to that given out by one 10-horse engine.

Reserve purifying power contained.

There is also a most important advantage arising from the height of these Scrubbers, in the reserve force contained in them. In the event of any stoppage, the mass of soaked and wetted material would continue the purification for hours, even if the supply of water and working were stopped from any cause.

Internal Materials not changed.

The changing of the soaking materials in these Scrubbers is very seldom required; they are well known to remain in action for seven years without being emptied.

Guarantee

They are in all cases erected under guarantees; they easily fulfil the stipulations of any Act of Parliament, and the chemical restrictions of the Board of Trade; and in cost they are much less to a Gas Company than any other known means of purifying Gas from Ammonia.

C. & W. WALKER.

8, *Finsbury Circus, London, E.C.*

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

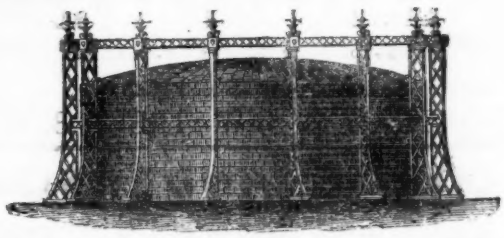
BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS, WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

HYDRAULIC, GAS, AND GENERAL ENGINEERS,

WHITEFRIARS STREET, LONDON, E.C.

Sole Manufacturers of MANN & OWENS'

PATENT SCREW & CAM GAS-VALVE,

Protected by Royal Letters Patent in England, France, Belgium, & the United States of America.

VALVE to OPEN DOWNWARDS.

BRIDGE-VALVE
for Regulating the Seal of Hydraulic Mains.

VALVE to OPEN UPWARDS.

The SPECIAL ADVANTAGES of MANN AND OWENS' PATENT VALVE are as follows:—

1. Its non-liability to become set fast through varying temperature or from the deposit from crude gas. 2. It is made absolutely gas-tight by the simple action of a screw and cam. 3. Inconvenience through the breakage of springs or wedges setting fast cannot arise. 4. The face of the Valve is scraped and cleaned of any solid matter at each operation of opening or closing.

The Valve can be had to work either in a Vertical or Horizontal position.

Every Valve is carefully tested under pressure, and warranted perfectly sound and gas-tight.

INSTRUCTIONS FOR ORDERING.

State whether required for above or below ground, if Double Flange or Socket and Spigot Valves are wanted, or with loose Flanged Socket and Spigot pieces.

The Prices include Indicators to show extent to which Valve is open.

Also makers of PILLAR-VALVES, SELF-ACTING BYE-PASS VALVES, OUTSIDE RACK AND PINION VALVES, HYDRAULIC-MAIN VALVES, DISC-VALVES, &c.

Every description of Pumping Apparatus, Hydraulic Lifts, &c., suitable for use in Gas-Works, made to order.

PRICES, SIZES, AND FULL PARTICULARS, WITH COMPLETE ILLUSTRATED CATALOGUE, FURNISHED ON APPLICATION.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

MECHANICAL AND CONSULTING GAS ENGINEER,

NORWOOD, NORTHENDEN ROAD,

SALE, NEAR MANCHESTER.

ALFRED LASS,

Fellow of the Institute of Chartered Accountants,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

30, GRACECHURCH STREET, LONDON.

Accounts Analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTER-MIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

THOMAS PROUD,

BROOKFIELD WORKS,

103, ICKNIELD ST., BIRMINGHAM,

MANUFACTURER OF

WOOD GRIDS

FOR

PURIFIERS AND SCRUBBERS,

AND

GENERAL STEEL AND IRON TOOLS AND MATERIAL USED IN GAS-WORKS.

BOX'S PATENT STREET GAS-LAMP

Has the following good qualities:—

1. No putty or other material is required for glazing. Thus there is no hacking out of old putty on removal of the glass, with the *consequent damage* to the lamp frames. 2. No liability to breakage by unequal expansion of the glass caused by changes of temperature. 3. Any inexperienced workman can glaze the lamp in a few minutes. 4. The system of glazing can be applied to any existing lamp at a trifling cost. 5. It is cheap, strong, and durable. 6. The glass can be easily removed so that the frames can be thoroughly painted inside and out.

The lamp may be supplied fitted with clear opal or ribbed glass, as *also with enamel tops* if required. The necessary fittings for altering existing lamps to this system can be supplied at moderate prices and a small charge for royalty. Licences granted on the most reasonable terms. For further particulars apply to the Patentee,

W. W. BOX,

Gas-Works, Crayford, Kent.

RETORT BOLTS,

AND ALL KINDS OF

BOLTS AND NUTS,

SUITABLE FOR

GAS-WORKS,

SUPPLIED BY

JOHN STANSFELD,

Bolt & Nut Manufacturer,

ALFRED ST., BOAR LANE, LEEDS.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

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TREES BOGHEAD.

SHOTTS BOGHEAD,

And all the first-class Scotch Cannels.

Prices and Analyses on application.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

For references and prices, either f. o. b. or by rail, apply to

W. RICHARDSON,

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WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of* 16·67-*candle gas, with* 1436 *lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON. London Agent: MR. F. J. LEE SMITH, Bromley, KENT.

STEPHEN HOBBS,

OF

CLARENCE VILLA, RAMSGATE,

CONTRACTOR FOR WELL SINKING

AND

SEWERING WORK GENERALLY,

Begs to inform Engineers and others that he has just completed the extensive and important excavations, amounting to 4000 cubic yards, for the Ramsgate Improvement Commissioners (under the direction of their Engineer, Mr. Valon), whereby a good and abundant supply of water has been obtained, and is now in a position to undertake further work in town or country.

References kindly permitted to be made to MR. WILLIAM A. VALON, C.E., RAMSGATE. Additional testimonials if required.

IMPORTANT to GAS COMPANIES.

ENORMOUS SAVING.

JOHN ABBOT & CO., LIMITED,

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Manufacture and Erect

HYDRAULIC CRANES

For Discharging Coal Barges;

WAGGON HOISTS

For Lifting Coals to Retort-House Stageway;

CAPSTANS

For Moving Trucks about the Yard,

And Apparatus for Lifting PURIFIER COVERS.

Examples to be seen at Beckton, Hull, &c., &c.

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CAST-IRON GAS AND WATER PIPES.

Sole Agents in Scotland for the Torbay Paint Co.

Prices on application.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

AND

NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES.

TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, will be sent, post free, on receipt of 4s. in stamps To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

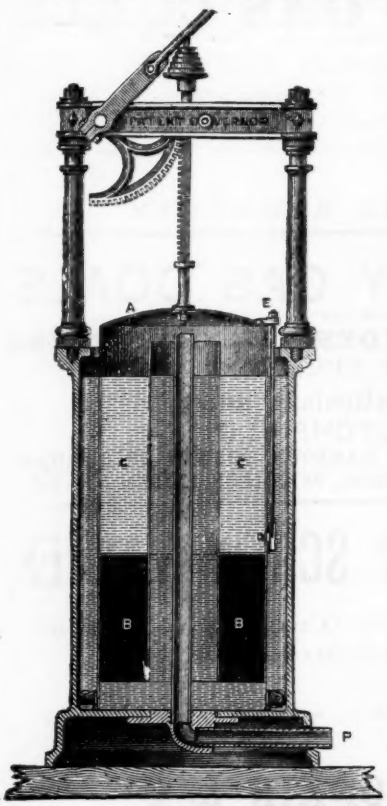
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS,

Patent Compensating Steam Governor,

WITH SELF-CONTAINED WATER-BALANCE.



This is the most efficient and perfect Governor yet made to control and regulate the speed of Engines and Exhausters according to the varying make of gas, and maintain a steady gauge, whether working level or with six inches of seal.

It is the only Governor that will effectually control Condensing and Compound Engines, especially when the Exhauster is on light work, and the Engine is large.

During the drawing and charging of Retorts, the Engine requires no attention—a matter of great importance in small works.

Descriptive Circular sent on application.

They are in use at

BECKTON,
HAMPTON WICK,
DUKINFIELD,
HARTLEPOOL,
NEWCASTLE-ON-TYNE,
RAMSGATE,
SUTTON,

and about 30 other works.

G. W. and Co. make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

See also advertisement, page 505.

PHŒNIX ENGINEERING WORKS,

Holland Street and Bear Gardens, Southwark, S.E.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

ALDWARKE MAIN AND CAR HOUSE COLLIERIES,

Near ROTHERHAM.

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD.

PROPRIETORS.

The Aldwarke Main Brights is a first-class gas-making and coking Coal, yielding by analysis 12,600 feet of 19-candle gas per ton, and giving "Weight of illuminating matter in lbs. of sperm, 820·80." It is very free from impurities and foreign matter.

Copies of Analyses made by Gas Companies who have used it will be forwarded and Samples sent on application.

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise 2000 tons per day of REAL OLD SILKSTONE GAS COAL.

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

THE WIGAN COAL & IRON COMPANY,

LIMITED.

MIDLAND DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: A. C. SCRIVENER,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

CANNEL AND GAS COALS.

THE DUKINFIELD COAL AND CANNEL COMPANY are prepared to deliver, to any Station, their Celebrated GAS COALS, which have a very high reputation for quantity of Gas and Illuminating Power, and make a First-class Coke.

Analyses and terms of delivery may be obtained by communicating with the above Company, at their Offices,

DUKINFIELD, NEAR MANCHESTER.

LONDONDERRY GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES.

COUNTY OF DURHAM.

For Prices and Particulars, apply to

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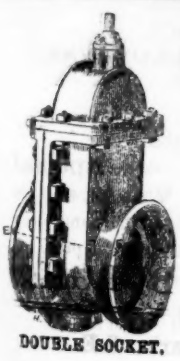
LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

London Agents: Messrs. LAMBERT BROS., 85, GRACECHURCH ST., E.C.



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IMPROVED SCREW-VALVES,

For Water, Tar, Ammoniacal Liquor, &c.

MADE EITHER WITH FLANGED OR SOCKET ENDS.

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For Preserving Service-Pipes.

Price from Three-Farthings per Foot,

In any Lengths.

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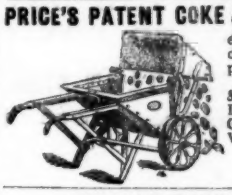


effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

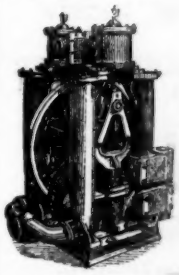
Prices are Reduced.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

John Cameron's Specialities



PATENT LEVER PUNCHING MACHINES AND HIS STEAM-PUMPS FOR GAS-WORKS,

Feeding Boilers, Steam Fire-Engines, Colliery Deep Lifts, Irrigation, Contractors, and Chemical purposes.

WORKS:

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NEW PATENT WET GAS-METER,
THE "RELIANCE,"

MANUFACTURED BY THE

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

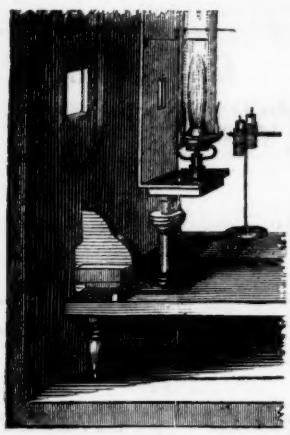
SOLE AGENT FOR SCOTLAND: JAMES KEITH, EDINBURGH AND ARBROATH.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

GAS-METER COMPANY, LIMITED,
238, KINGSLAND ROAD, LONDON.



ERRORS IN THE PHOTOMETRIC ESTIMATION OF THE VALUE OF GAS
are AVOIDED by the use of
METHVEN'S
ILLUMINATING POWER STANDARD.

The Illustration shows the application of the METHVEN STANDARD to a LETHEBY PHOTOMETER, with provision for the use of candles in the most approved manner.

All STANDARDS will, in future, be numbered, and be accompanied by a certificate signed by Mr. Methven and by our Manager, Mr. F. W. Hartley.

Prices and particulars to be obtained from the
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Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,
THE UNVARYING WATER-LINE GAS-METERS,
IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;
STATION-METERS, ALL SIZES, with PLANED JOINTS;
Experimental Meters, Photometers, Pressure-Gauges, Governors, Test Holders, &c., &c.

LONDON OFFICE:
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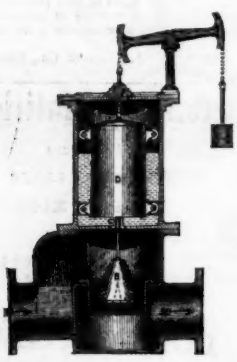
PEEBLES'S
PATENT GAS GOVERNORS,



Patent Safety Station-Governor.

FOR
Stations, Districts, Public Lamps, & Dwelling-Houses,
Are meeting with increasing favour, and giving full satisfaction where they are in use.

Wet and Dry Gas-Meters of Superior Excellence, Station-Meters, &c.

Prices and Illustrations Post Free on Application.

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